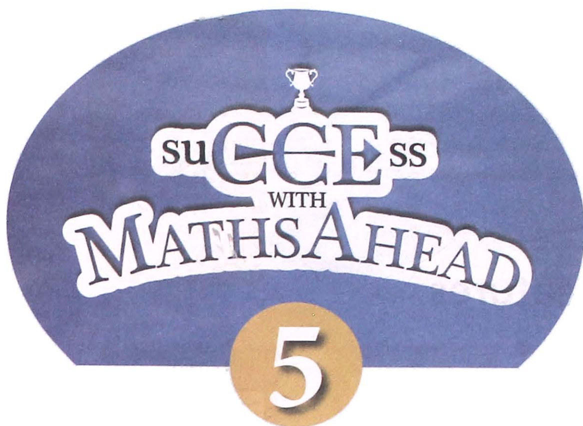


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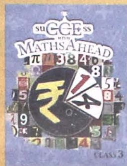
Orient BlackSwan

Success with MathsAhead
is developed in accordance with:

- CCE—the CBSE's educational initiative for more effective teaching and learning
- the curriculum framed by the NCERT and the guidelines as laid down by the NCF 2005
- tried and tested methodology in the teaching of mathematics
- the needs of the teacher and student

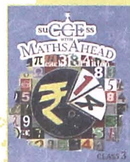
The Package

Student's Edition



- carefully graded text
- attractive layout

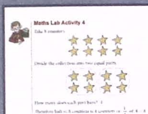
Teacher's Edition



- description of Teacher's Manual
- list of tasks for FA present in the book
- sample lesson plans

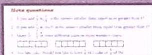
CCE Features

Maths Lab Activities



develop concepts, enhance skills including life skills and application

HOTS



improve students' understanding, analytical and problem-solving skills.

Exercises for FA and SA

Exercise 1.4

A. Write the numeral for the number name as shown.

1) Three thousand four hundred twenty four
2) Eight thousand five hundred eighty seven
3) Seven thousand one hundred seventy
4) Three thousand five hundred twelve
5) One thousand seven hundred twenty-one
6) Two thousand two hundred three
7) Five thousand six hundred three
8) Six thousand four hundred fifty-four
9) Nine thousand forty-eight
10) Eight thousand three hundred twenty-nine

a variety of questions:

- fill in the blanks
- long answer
- short answer

MCQs

MCQs

1. 1 kilometre is equal to:
   a) 1 m b) 10 m c) 100 m
2. Your height is closest to:
   a) 10 cm b) 1 m c) 5 m
3. Your hand span is closest to:
   a) 5 m b) 1 m c) 50 cm
4. How many centimetres make a metre?
   a) 1 b) 10 c) 100

give timely feedback and contribute to learning

Chapter Overview

LESSON OBJECTIVES (NEW)
encourage students to evaluate their progress and take responsibility for their learning

→ **WARM UP**
draws students into the lesson
prepares them for new learning

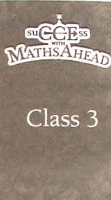
→ **TEXT**
is carefully graded
enables understanding
visually appealing

→ **LIFE SKILLS** (NEW)
promote skills that help students lead healthy and productive lives

→ **FUN ACTIVITY** (NEW)
sharpens the students' mind

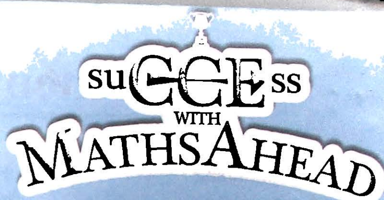
→ **SUMMATIVE ASSESSMENT**
for exam practice

Teacher's Manual



Teacher's Manual

- about the series
- note on CCE
- compatabilty of the books with CCE
- chapter-wise lesson plans
- chapter-wise worksheets with answers
- chapter-wise question bank
- summative assessments papers



CD-ROM

- interactive!
- exciting!



Website



A portal devoted to the series with free access for the teacher

Worksheets for Formative Assessment



- written assignments
- simple projects
- discussions, field trips

Fun Activities

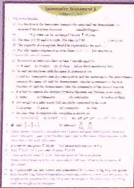
games and puzzles that sharpen the students' mind

Life skills

promote

- decision making
- problem solving
- critical thinking
- self management

Summative Assessment papers



for exam practice!

MATHS LAB ACTIVITY

helps to develop concepts, skills and encourages applications of knowledge gained

GUIDED LEARNING

solved and semi-solved examples enable the students to gain confidence to handle unsolved exercises

EXERCISES FOR FA AND SA

include a wide variety of questions—long and short answer

WORKSHEET FOR FA

NEW

assess concepts, thinking and application ability

MCQs

NEW

provide timely feedback
contribute to self-learning

HOTS

NEW

improve students' understanding, analytical and problem-solving skills

gnments: Exercises in each chapte

CD-ROM (IT): pg 47, 68, 69, 81, 97, 110 etc

s: Games, puzzles and quizzes: pg 11, 32, 43, 63 etc (Worksheets)

cts and presentations: Several Maths Lab Activities and Fun Activities can be used as ts, e.g. pg 28, 101

vith paper: pg 113, 115, 120 (Maths Lab Activities)

ent and self assessment: a range of exercises across the book can be used for this

se: HOTS questions in every chapter, e.g. pg 11, 32, 43, 63 etc.

ssion: Warm Up activity pg 64, Fun Activities on pgs 109, 122, 128, 130

, 158, 163 (making a picture model to solve difficult problems), 171, 181

/ITH MATHSAHEAD BOOK 5

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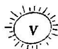
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Contents





List of activities in CD  Reference page numbers in text

Large Numbers

1

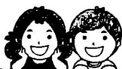
Learning Objectives



You will be able to:

- extend the place-value system to beyond 8 digits, in the Indian and the international systems.
- round off to the nearest ten, hundred, thousand and lakh.
- read and write Roman numerals up to 1000.

Warm Up



• Recall— Large numbers

The number system can be extended to numbers having 7, 8 or more digits.

The largest 6-digit number is ________________________.

1 more than 9,99,999 = 10,00,000

This is read as 10 lakhs. It is a 7-digit number.

10 lakhs = 10,00,000 100 lakhs = 1,00,00,000

100 lakhs is also read as 1 crore. It is an 8-digit number.

1 crore = 1,00,00,000

Look at the number 3,61,58,632 in a place-value chart.

CRORES	LAKHS		THOUSANDS		ONES		
Crores	Ten lakhs	Lakhs	Ten thousands	Thousands	Hundreds	Tens	Ones
3	6	1	5	8	6	3	2

This is read as: three crore sixty-one lakh fifty-eight thousand six hundred thirty-two.

This number in the international place-vlaue chart is:

MILLIONS		THOUSANDS			ONES		
Ten millons	One millions	Hundred thousands	Ten thousands	One thousands	Hundreds	Tens	Ones
3	6	1	5	8	6	3	2

It is read as: thirty-six million one hundred fifty-eight thousand six hundred thirty-two.

Recall Exercise

A. Write the number names: 1) 54357 2) 524152 3) 7600309 4) 56126021

B. Write the numeral for the number names.

1) Twenty-eight thousand one hundred fourteen 2) Ninety thousand nine hundred ninety
3) Nine lakh fifty-four thousand six hundred one 4) Three lakh three
5) Five crore sixteen lakh twenty thousand five hundred thirty-one
6) Eighty-four million three hundred forty-nine thousand one hundred thirty-two.

C. How many: 1) tens make a lakh? 2) hundreds make a crore? 3) lakhs make a million?

• Extension of the number system

Shown below is the place-value chart for the first nine places in the Indian number system.

CRORES		LAKHS		THOUSANDS		ONES		
Ten crores	One crores	Ten lakhs	One lakhs	Ten thousands	One thousands	Hundreds	Tens	Ones
1	0	0	0	0	0	0	0	0

The table also shows the different periods. They are the ones period, the thousands period, the lakhs period and the crores period. The digits in the same period are read together.

CRORES		LAKHS		THOUSANDS		ONES		
Ten crores	One crores	Ten lakhs	One lakhs	Ten thousands	One thousands	Hundreds	Tens	Ones
7	0	3	4	5	6	7	1	0

The number in the place-value chart is read as:

Seventy crore thirty-four lakh fifty-six thousand seven hundred ten

The digits in the crores period are 7, 0.

The digits in the lakhs period are 3, 4.

The digits in the thousands period are 5, 6.

The digits in the ones period are 7, 1, 0.

In the place-value chart, the place-value of a digit is ten times the place-value of the next digit on the right. Thus

1 ten	=	**10 ones**
1 hundred	=	**10 tens**
1 thousand	=	**10 hundreds**
1 ten thousand	=	**10 thousands**
1 lakh	=	**10 ten thousands**
1 ten lakh	=	**10 lakhs**
1 crore	=	**10 ten lakhs**
1 ten crore	=	**10 crores**

Exercise 1.1

A. Write the place-value of the underlined digits.

Number	Place-value
78,36,00,342	________
38,49,32,101	4 ten lakhs or forty lakhs
49,19,26,008	________
56,23,19,300	________

B. Write the following numerals in a place-value chart. Read them and write their number names.

1) 362412250 2) 70012020 3) 92400035

4) 274650132 5) 724999 6) 850402100

C. Write the numerals for the following number names using a place-value chart.

1) Eight crore thirty-two lakh nineteen thousand three hundred five.
2) Seventeen crore twenty-six lakh nineteen thousand.
3) Sixty-four crore ninety-nine thousand nine hundred three.
4) Seventy-nine crore eighty thousand twelve.
5) Ninety-nine crore ninety-nine lakh ninety-nine thousand nine.

D. Fill in the missing numerals to continue the pattern.

1) 67,21,057 , 67,22,058 , ________ , ________ , ________
2) 3,40,51,278 , 3,41,51,278 , ________ , ________ , ________
3) 70,21,761 , 70,21,861 , ________ , ________ , ________
4) 6,72,26,021 , 6,82,26,021 , ________ , ________ , ________
5) 48,62,36,506 , 58,62,36,507 , ________ , ________ , ________

• Expanded form/order relation

You already know how to write a number in its expanded form. Here is an example.

54,734 = 50,000 + 4000 + 700 + 30 + 4

Larger numbers are written in the expanded form in the same way.

43,59,06,246 = 40,00,00,000 + 3,00,00,000 + 50,00,000 + 9,00,000 + 6000 + 200 + 40 + 6

Exercise 1.2

A. Write the following numbers in the expanded form. In each case write down the place value of 3.

1) 385696	2) 4896593	3) 896753214	4) 302056709
5) 20803050	6) 64300060	7) 987654321	8) 340042119

B. Write the following in the standard form.

1) 6000000 + 500000 + 40000 + 3000 + 200 + 10 + 1

2) 800000000 + 90000000 + 3000000 + 800000 + 30000 + 20 + 2

3) 500000000 + 5000000 + 50000 + 500 + 5

4) 100000000 + 100 + 9

5) 6000000000 + 5000000 + 400000 + 70000 + 8000 + 90 + 1

Order relations

You already know the method of comparing two numbers. We compare the leftmost digit first. If these are the same we compare the next digit on the right, and so on. The same method is used for large numbers.

Example 1 : Compare 56934978 and 3856646.

56934978 is an 8-digit number; 3856646 is a 7-digit number.

Therefore 56934978 > 3856646

Example 2 : Compare 38945678 and 48659678.

Both are 8-digit numbers. Compare the left-most digit (i.e. the crores). Since 4 > 3, therefore 48659678 > 38945678

Example 3 : Compare 464396789 and 463989789.

Both are 9-digit numbers. The ten-crores and the crores digit are the same. Compare the ten-lakhs digit. Since 4 > 3, therefore 464396789 > 463989789

Exercise 1.3

A. Fill in the blank with > or <.

1) 38649586 ☐ 48649586

2) 10040004 ☐ 10030003

3) 123456789 ☐ 987654321

4) 123456780 ☐ 123456789

5) 878787878 ☐ 87878787

6) 606060606 ☐ 600606060

B. Arrange in ascending order.

1) 38547986, 385479860, 3854798, 385479850

2) 18653496, 338534896, 438534896, 99999999

3) 634398, 6664398, 66664398, 43986666

4) 5896349, 6896349, 5896348, 6896348

5) 22262222, 22622222, 26222222, 22226222

C. Arrange in descending order.

1) 3329567, 3426799, 3415999, 3025859

2) 123456789, 234567891, 345678912, 345678901

3) 5783421, 57834210, 578342100, 478342100

4) 78943025, 78940325, 78904325, 78094325

5) 921467352, 86345943, 73546265, 289453207

D. Write down the following.

1) largest 7-digit number

2) largest 8-digit number

3) smallest 8-digit number

4) smallest 9-digit number

E. Use the following digits to write the smallest and the greatest number you can form. Use each digit only once. The number should not start with 0.

1) 3, 4, 6, 0, 9, 8

2) 9, 8, 6, 0, 5, 4, 1

3) 7, 4, 3, 2, 1, 0, 6, 9

4) 2, 1, 0, 7, 9, 8, 6, 4, 3

F. Find the smallest and the greatest number in each group.

1) 567345, 5673045, 36734500, 39425060

2) 7654986, 5673205, 999999, 10000000

3) 683495670, 68349567, 58400906, 321111460

4) 123321123, 132231132, 213312213, 321123321

• International place-value chart

Place-value charts are not the same everywhere. Other than the Indian Place-Value System there is also an International Place-Value System, shown below.

MILLIONS			THOUSANDS			ONES		
Hundred millions	Ten millions	One millions	Hundred thousands	Ten thousands	One thousands	Hundreds	Tens	Ones
3	4	6	5	3	2	0	1	8

In this table there are 3 periods—the ones period, the thousands period and the millions period.

In the International Place-Value System we use **hundred thousands and millions** instead of lakhs and crores.

1 lakh = 1 hundred thousand or 100,000

10 lakhs = 1 million

1 crore = 10 millions

10 crores = 100 millions

Read the numbers given in the table. Here also the digits in the same period are read together.

MILLIONS			THOUSANDS			ONES		
Hundred millions	Ten millions	One millions	Hundred thousands	Ten thousands	One thousands	Hundreds	Tens	Ones
2	6	7	8	1	3	3	1	0
3	4	5	9	7	0	8	9	2
6	5	9	8	0	4	4	0	8
4	3	3	7	3	0	0	5	7

The first number is read as :

Two hundred sixty-seven million eight hundred thirteen thousand three hundred ten.

The digits in the millions period are 2, 6, 7

The digits in the thousands period are ________, ________, ________

The digits in the ones period are ________, ________, ________

Read the other numerals in the same manner and name the digits in the different periods.

Exercise 1.4

A. Complete the table given below.

A digit in each of the following numerals is underlined. Write the place-value of this underlined digit in the International Place-Value System.

Number	Place-value
403,342,<u>6</u>00	________
18,3<u>1</u>9,203	________
24<u>6</u>,432,000	________
<u>2</u>5,036,018	________

B. Using the International Place-Value Chart write the following as numerals and fill in the table given below.

1) Three hundred fifteen million six thousand four hundred sixty-five.

2) Six hundred five million two hundred eighty-five thousand two hundred fifty.

3) Nine hundred million eighty-nine thousand three hundred twenty-nine.

4) Sixty-two million four hundred thirty-two thousand six hundred ten.

5) Eight hundred six million eight thousand seventy-five.

6) Ninety million eighty thousand seventy.

MILLIONS			THOUSANDS			ONES		
Hundred millions	Ten millions	One millions	Hundred thousands	Ten thousands	One thousands	Hundreds	Tens	Ones
3	1	5	0	0	6	4	6	5
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

• Rounding numbers

Let us recall the rules of rounding numbers.

- To round a number to the nearest ten, we round it to the multiple of ten nearest to it.
- A number which is midway is always rounded up.

Examples : 26 is rounded to 30; 132 is rounded to 130; 825 is rounded to 830

- To round a number to the nearest hundred, we round it to the multiple of hundred nearest to it.
- A number which is midway is always rounded up.

Examples : 826 is rounded to 800; 1259 is rounded to 1300; 850 is rounded to 900

- To round a number to the nearest thousand, we round it to the multiple of thousand nearest to it.
- A number which is midway is always rounded up.

Examples : 4826 is rounded to 5000; 1259 is rounded to 1000; 2500 is rounded to 3000

• Rounding large numbers

We can now extend the rule of rounding off, to the nearest ten thousand, lakh, ten lakh and so on

Rounding to the nearest ten thousand

[3] 8, 2 4 9	Digit in the thousands place is 8. Since 8 > 5, the number 38,249 is closer to 40,000 than 30,000 Thus the number is rounded to 40,000
[5] 1, 3 2 4	Digit in the thousands place is 1. Since 1 < 5, the number 51,324 is closer to 50,000 than 60,000 Number is rounded to ____________
[4] 5, 0 0 0	The number is rounded to 50,000

Rounding to the nearest lakh

[2], 5 6, 2 9 3	Digit in the ten thousands place is 5; 5 ≥ 5 So change [2] to __________ Number is rounded to __________
[5], 4 3, 1 0 2	Digit in the ten thousands place is 4; 4 < 5 So [5] will remain as it is. The number is rounded to ________
[8], 5 0, 0 0 0	Number is rounded to __________

Exercise 1.5

A. Round the numbers to the nearest ten.

1) 28   2) 188   3) 250   4) 101   5) 122

B. Round the numbers to the nearest hundred.

1) 252   2) 5389   3) 4500   4) 909   5) 765

C. Round the numbers to the nearest thousand.

1) 4595   2) 64322   3) 999   4) 1500   5) 1495

D. Round the numbers to the nearest ten thousand.

1) 43,150   2) 53,109   3) 60,349   4) 79,432   5) 85,000

E. Round the numbers to the nearest lakh.

1) 1,56,932 2) 2,09,321 3) 4,18,399 4) 5,93,299 5) 8,50,000

F. Round the numbers to the nearest ten lakh.

1) 34,75,678 2) 49,80,031 3) 50,93,987 4) 85,00,000 5) 15,55,555

• Roman numerals

You have already learnt that the Romans used a different system of numeration which they developed 2000 years ago. They used seven letters of the alphabet as basic symbols to write any number. These are as follows.

I = 1 X = 10 C = 100 M = 1000

V = 5 L = 50 D = 500

There is no zero in the Roman system. An important difference between the decimal system and the Roman system is that the Roman system does not use place value.

Study the following rules to read and write numerals in the Roman system.

Rule 1 : Numerals I, X, C and M can be repeated to represent a number. Repetition of these numerals means addition.

e.g. II = 2, XXX = 30, CCC = 300, MM = 2000

The symbol I, X and C cannot be repeated more than 3 times in a numeral,

e.g. 4 is written as IV, not IIII.

Symbols, V, L, D are not repeated.

Rule 2 : A smaller numeral written to the right of a numeral of greater value is always added to the greater numeral.

e.g. VII = 5 + 2 = 7 XI = 10 + 1 = 11 LX = 50 + 10 = 60 MC = 1100

Rule 3 : A smaller numeral written to the left of a numeral of greater value is always subtracted from the greater numeral.

e.g. IV = 5 − 1 = 4 XC = 100 − 10 = 90

CD = 500 − 100 = 400 CM = 1000 − 100 = 900

Rule 4 : When a smaller numeral is placed between two numerals of greater value, it is always subtracted from the greater numeral immediately following it.

e.g. XXIX = 10 + 10 + (10 – 1) = 29 DIX = 500 + (10 – 1) = 509

The symbol I can be subtracted from V and X.

The symbol X can be subtracted from L and C.

The symbol C can be subtracted from D and M.

Symbols V, L, D are never subtracted.

Example 1 : Write 3249 in Roman numerals.

3249 = 3000 + 200 + 40 + 9

= MMM + CC + XL + IX

= MMMCCXLIX

Example 2 : Write MDCLXVII in Hindu-Arabic numerals.

MDCLXVII = M + DC + LX + VII

= 1000 + 600 + 60 + 7

= 1667

Exercise 1.6

A. Write the following numbers in Roman numerals.

1) 36	2) 39	3) 506	4) 791
5) 312	6) 979	7) 999	8) 731
9) 2800	10) 1347	11) 1526	12) 2350

B. Write the following numbers in Hindu-Arabic numerals.

1) XXVII	2) XXXIX	3) DXC	4) LIX
5) DCCLXXVI	6) CMLXIX	7) CCXVII	8) CDIV
9) CMLXXI	10) MXXXIV	11) MCXI	12) MCCXLVII

WORKSHEET

for formative assessment



MCQs

1. One crore two hundred two is equal to:
   a) 1000220 b) 10000202 c) 1000000202 d) 100000202
2. Forty-five crores thirty thousand one is equal to:
   a) 45 millions 30 thousands and 1 b) 450 millions 300 thousands and 1
   c) 450 millions 30 thousands and 1 d) 45 millions 300 thousands and 1
3. To round a number to the nearest hundred, we round it to the nearest:
   a) multiple of ten b) multiple of hundred c) multiple of thousand d) multiple of lakh
4. What is CDXCIX?
   a) 5909 b) 419 c) 499 d) 699
5. How many crores are there in hundred millions?
   a) 1 b) 10 c) 100 d) 1000

Hots questions

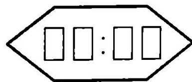
A. Find out
   a) 1 added to the largest 7-digit number.
   b) 1 added to the largest 8-digit number.
   c) 1 subtracted from the smallest 8-digit number.
   d) 1 subtracted from the smallest 9-digit number.

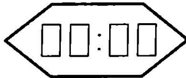
B. What is lakh times 700 added to 7 lakh times 50?

C. Find the sum of largest 9-digit number and the smallest 5-digit number.

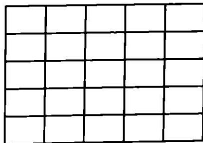
Fun activity

1. These are 12-hour digital clocks.
   Fill in the digits on the clocks so that the digits have the smallest and greatest sums.


= ☐
smallest sum


= ☐
greatest sum

2. Place five Ys in the given grid so that there is not more than one Y in each row, column or diagonal.



Hint – you can do it in 2 ways

Operations with Numbers

2

Learning Objectives



You will be able to:

- carry out addition, subtraction, multiplication and division of up to 7-digit numbers.
- carry out calculations by following the correct sequence of operations in a sum with or without brackets.
- find the average of a group of given values.
- use the unitary method to find solutions to simple problems.

Warm Up



- **Recall exercise**

Add:

1)
```
    4 0 2 4 3
    2 5 3 2 1
+     3 0 2 4
-------------

-------------
```

2)
```
    3 0 7 2 3
    1 3 1 5 4
+   4 2 0 0 2
-------------

-------------
```

Subtract:

1)
```
  4 6 4 0 5 0
- 3 4 2 0 3 0
-------------

-------------
```

2)
```
  5 3 8 0 0 0
-     9 7 5 6
-------------

-------------
```

3)
```
  8 6 5 0 1
- 2 3 1 7 9
-----------

-----------
```

Multiply:

1) $7 \times 2000 =$ ________

2)
```
  7 8 9
× 2 3 1
-------

-------
```

Divide : 1) $480 \div 4$ 2) $6792 \div 11$ 3) $3960 \div 3$ 4) $3089 \div 16$

• Addition and subtraction

You have already learnt how to add and subtract 5 and 6 digit numbers in class 4. Addition and subtraction of higher numbers is done in the same way. Look at the examples below.

Example 1 : Add	**Example 2 :** Subtract
1 1 1 2 1 1 3 6 0 8 9 2 6 5 6 0 8 6 3 + 5 6 9 7 5 2 8 9 8 6 7 3 1 7	6 15 7 11 9 ~~7~~ ~~6~~ 7 ~~8~~ ~~2~~ ~~0~~ ~~3~~ − 3 9 8 6 4 7 5 3 6 9 1 7 2 8

Exercise 2.1

A. Add

1) 3890214 5983945 839125 + 459830	2) 784567 5632920 324571 + 145698	3) 854392 1975672 493267 + 40530	4) 629938 75726 947242 + 76526
5) 72998 783250 1625793 + 524314	6) 45793 763287 597961 + 783245	7) 79643219 3824312 634960 + 50304090	8) 333333333 33333333 444444444 + 5555555

B. Subtract

1) 6044813 − 3123489	2) 3865949 − 3385959	3) 48239463 − 8083646	4) 987654320 − 898765432
5) 780000506 − 391082041	6) 787385670 − 78738567	7) 38600439 − 29533420	8) 38534836 − 37625745

C. Add/Subtract as required.

1) 4837904 + 3728124 + 364598763

2) 58963456 + 32865943 + 300400500 + 112233445

3) 678943 + 6789432 + 67894321 + 678943210

4) 253224406 – 132433587

5) 780000606 – 491083418

6) 183838383 – 182828282

Exercise 2.2 : Word problems

1) Ravi's father bought two houses: one for ₹ 12,56,000 and the other for ₹ 23,48,000. How much did he spend altogether? By how much was the second house more expensive than the first?

2) In a town, there are 2 public libraries. The number of books in one library is 3,48,386 and the number of books in the other is 5,17,058. What is the total number of books in both the libraries? How many more books does the second library have?

3) An industry earned ₹ 1,56,48,000 in a year. If the expenses were ₹ 69,74,596, how much money was saved?

4) By how much is 8,97,12,000 greater than 5,88,48,432?

5) By how much is 11,75,815 less than 14,14,396?

6) The sum of two numbers is 23,78,54,639. One of them is 59,68,708. Find the other.

7) In an election Mr Bharath secured 32,48,329 votes and Mr Kishore secured 3,26,45,806 votes. By how many votes did Mr Kishore win? What was the total number of votes cast?

8) In an election there were three candidates A, B and C. Candidate A got 5,65,68,496 votes, Candidate B got 6,68,35,608 votes. If the total number of votes was 22,36,50,608, how many votes did Candidate C get? Who won the election?

9) Mr Buddha bought a house for ₹ 65,43,200. He spent ₹ 35,46,300 in repairing it. If he then sold the house for ₹ 99,99,900, did he lose or gain money? How much?

10) Lovely Public School bought 2 buses and a car for ₹ 20,55,300. If the cost of a bus is ₹ 8,45,560, find the cost of the car.

• Multiplication

Let us recall the important properties of multiplication.

The product of two numbers does not change if the order of the numbers multiplied is changed.



Thus $5 \times 7 = 35$, $7 \times 5 = 35$; $22 \times 11 = 242$, $11 \times 22 = 242$



The product of three numbers does not change, if the grouping of the numbers is changed.

Thus $(2 \times 3) \times 4 = 2 \times (3 \times 4) = (2 \times 4) \times 3 = 24$

The product of 1 and any number is the number itself.



Thus $22 \times 1 = 22$; $268989432 \times 1 = 268989432$



The product of zero and any number is zero.

Thus $11 \times 0 = 0$; $38545621 \times 0 = 0$

To multiply a number by 10, put a zero on the right of the number. To multiply by 100 put 2 zeros on the right and so on.



Thus $6432 \times 10 = 64320$; $33486 \times 100 = 3348600$

You have learnt to multiply two numbers of 3 digits each in Class IV. Now study the following examples.

Example 1 :

```
     1 4 3 4
×      2 7 8   →  278 = 200 + 70 + 8
   1 1 4 7 2   →  1434 × 8 = 11472
 1 0 0 3 8 0   →  1434 × 70 = 100380
 2 8 6 8 0 0   →  1434 × 200 = 286800
 3 9 8 6 5 2   →  1434 × 278
```

Example 2 :

```
         3 2 1 2
×        2 3 0 5   →  2305 = 2000 + 300 + 5
       1 6 0 6 0   →  3212 × 5 = 16060
     9 6 3 6 0 0   →  3212 × 300 = 963600
   6 4 2 4 0 0 0   →  3212 × 2000 = 6424000
   7 4 0 3 6 6 0   →  3212 × 2305
```

Exercise 2.3 : Multiply

1) 344 by 372	2) 286 by 149	3) 263 by 345
4) 725 by 598	5) 3547 by 764	6) 5789 by 123
7) 9895 by 342	8) 6834 by 758	9) 9039 by 261
10) 2734 by 367	11) 4038 by 211	12) 7067 by 593
13) 4219 by 2400	14) 8507 by 1234	15) 4324 by 3609

Exercise 2.4 : Word problems

Example 1 : The air ticket from Delhi to Dubai is ₹ 8678.
In a flight 135 passengers travelled from Delhi to Dubai.
What was the total fare paid by the passengers?

Cost of 1 ticket = ₹ 8678

Cost of 135 tickets = 135 × ₹ 8678 = ₹ 1171530

$$\begin{array}{r} 8678 \\ \times\ 135 \\ \hline 43390 \\ 260340 \\ 867800 \\ \hline 1171530 \end{array}$$

1. The cost of a bicycle is ₹ 564. What is the cost of 285 bicycles?

2. A 4-digit number starts with 25. The next two digits are 3 times the first 2 digits. This 4-digit number is multiplied by 352. What is the product?

3. Find twenty-four thousand three hundred twenty-one added to itself 25 times.

4. Find three thousand one hundred thirty-two added to thirty thousand and the sum multiplied by thirty-eight.

5. Find forty-two lakh eighty-two thousand three hundred ninety-seven multiplied by eighteen.

6. One box of pencils costs ₹ 18. What will be the cost of 14,919 boxes of pencils?

7. In a factory 3525 nails are made per day. How many nails are made in 237 days?

8. What is the product of the largest 4-digit number and the largest 2-digit number?

9. A book has 236 pages. If 1135 copies of the book were printed, how many pages in all were printed?

10. Mr Nixon earns ₹ 12,560 per month. He saves half of this amount. If he saves the same amount for 10 years, how much money would he save?

• Division

Let us recall how to divide a number by 10; 100; 1000

75 ÷ 10. The quotient is 7. The remainder is 5.

When a number is divided by 10, the digit in the ones place is the remainder.

864 ÷ 100. The quotient is 8. The remainder is 64.

When a number is divided by 100, the number formed by the tens and ones place is the remainder.

9756 ÷ 1000. The quotient is 9. The remainder is 756.

When a number is divided by 1000, the number formed by the digits in the hundreds, tens and ones place is the remainder.

Exercise 2.5 : Write the quotient and the remainders for the following.

1) 6,85,643 ÷ 10	2) 2,40,701 ÷ 1000	3) 3,46,538 ÷ 1000
4) 66,69,987 ÷ 100	5) 70,80,901 ÷ 10,000	6) 26,36,48,536 ÷ 10,00,000

Division of 4-digit number by a 2-digit number

Study the following.

Example 1:

```
      56
35 | 1976
     175
      226
      210
       16
```

35 > 19.

Therefore divide 197 tens by 35.

35 × 5 = 175 and 197 > 175.

Write 5 tens in the quotient and subtract 175 from 197.

197 – 175 = 22. Bring down 6 ones.

35 × 6 = 210 and 226 > 210

Write 6 ones in the quotient and subtract 210 from 226.

226 – 210 = 16

35 > 16. Since 16 cannot be divided further, it is the remainder.

Quotient : 56 **Remainder : 16**

To check the answer : Dividend = Divisor × Quotient + Remainder

Therefore, Dividend = 35 × 56 + 16 = 1960 + 16 = 1976

Exercise 2.6 : Work out the following division sums.

1) 3426 ÷ 22	2) 4896 ÷ 30	3) 1489 ÷ 43	4) 3876 ÷ 29
5) 9894 ÷ 82	6) 6831 ÷ 71	7) 4831 ÷ 54	8) 3683 ÷ 36

Division of larger numbers

Let us learn how to divide a 5-digit or 6-digit number by a 2-digit or a 3-digit number.

Example 1 : 48032 ÷ 54

```
      889
54 | 48032
     432
      483
      432
       512
       486
        26
```

54 > 48 therefore, divide 480 by 54.

54 × 8 = 432 and 432 < 480

Write 8 hundreds in the quotient and subtract 432 from 480.

480 – 432 = 48

Bring down 3 tens. 54 × 8 = 432 and 432 < 483

Write 8 tens in the quotient and subtract 432 from 483.

483 – 432 = 51

Bring down 2 ones. 54 × 9 = 486 and 486 < 512

Write 9 ones in the quotient and subtract 486 from 512.

512 – 486 = 26.

54 > 26. Since 26 cannot be divided further, it is the remainder.

Quotient : 889 **Remainder : 26**

To check the answer : 54 × 889 = 48006; 48006 + 26 = 48032

Example 2 : Divide 283419 by 378

```
          749
378 | 283419
      2646
       1881
       1512
        3699
        3402
         297
```

378 > 283. Divide 2834 by 378. 378 × 7 = 2646

Write 7 thousands in the quotient.

2834 – 2646 = 188. Bring down 1 hundred. We have 1881

378 × 4 = 1512. Write 4 hundreds in the quotient.

1881 – 1512 = 369. Bring down 9 ones. We have 3699.

378 × 9 = 3402. Write 9 tens in the quotient. 3699 – 3402 = 297

Quotient : 749 **Remainder : 297**

To check the answer: 378 × 749 = 283122; 283122 + 297 = 283419

Exercise 2.7 : Work out the following.

1) 62, 032 ÷ 56	2) 18, 325 ÷ 43	3) 69, 000 ÷ 35
4) 92, 031 ÷ 76	5) 3, 50, 925 ÷ 56	6) 2, 48, 932 ÷ 45
7) 1, 49, 826 ÷ 68	8) 8, 20, 062 ÷ 86	9) 61, 234 ÷ 169
10) 29, 030 ÷ 248	11) 36, 452 ÷ 333	12) 72, 980 ÷ 286
13) 5, 26, 002 ÷ 374	14) 5, 19, 460 ÷ 264	15) 8, 56, 232 ÷ 490

- ## Word problems

Example 1 : 22428 balls are packed equally in 89 boxes.

How many balls are packed in each box?

89 boxes contain 22428 balls

∴ 1 box contains 22428 ÷ 89 balls

= 252 balls

```
      2 5 2
89 | 2 2 4 2 8
     1 7 8
     -----
       4 6 2
       4 4 5
       -----
         1 7 8
         1 7 8
         -----
             0
```

Example 2 : A fruit seller had 200000 apples.

He packed them in boxes. Each box contained 176 apples.

How many boxes were used and how many apples were left over?

176 apples are packed in 1 box

∴ 200000 apples are packed in 200000 ÷ 176 boxes

The quotient gives the number of boxes, and the remainder gives the number of apples left over.

1136 boxes were used. And 64 apples were left over.

```
              1 1 3 6
176 | 2 0 0 0 0 0
      1 7 6
      -----
        2 4 0
        1 7 6
        -----
          6 4 0
          5 2 8
          -------
          1 1 2 0
          1 0 5 6
          -------
              6 4
```

Exercise 2.8

1) 68 people can travel in one bus. How many buses will be needed for 1904 people going on a pilgrimage?
2) A factory produces 56,224 nuts in 28 days. How many nuts does it produce per day?
3) If 225 litres of water is supplied to a family, how many families can be supplied with 42,075 litres of water?
4) Find the least number that should be subtracted from 80,600 so that the result is exactly divisible by 91.
5) Find the least number that should be added to 36,516 so that the result is exactly divisible by 456.
6) A fruit seller had 4,64,367 oranges. He packed them in boxes, with each box containing 325 oranges. Find the number of boxes and the number of oranges left over.
7) 3,52,668 kg of wheat was stored in the godowns of Food Corporation of India. If the wheat was stored in bags of 125 kg each, how many bags were there? (Hint: one of the bags will contain less than 125 kg)

• Simplification of numerical expressions

Many times we come across numerical expressions with two or more operations occurring together.

Let us learn to simplify such numerical expressions.

Consider the following numerical expression.

$16 + 12 \div 4 \times 5 - 2$

There are various methods of working this out.

First Method

$(16 + 12 \div 4) \times 5 - 2$ Brackets show which operations are done first in each line.

$= (28 \div 4) \times 5 - 2$

$= (7 \times 5) - 2$

$= 35 - 2 = 33$

Second Method

$16 + (12 \div 4) \times 5 - 2$

$= (16 + 3) \times 5 - 2$

$= (19 \times 5) - 2$

$= 95 - 2 = 93$



Third Method

$16 + 12 \div (4 \times 5) - 2$

$= (16 + 12) \div 20 - 2$

$= 28 \div (20 - 2)$

$= 28 \div 18 = 1.55$

You could try out more such combinations.

Did you notice that on simplifying the given numerical expression in three different ways we get three different solutions? Which is the correct solution? If neither of the above three solutions is correct, how can we get the correct solution?

We follow a simple rule to solve such numerical expressions.

Rule : We perform operations in a particular order—first, we do **division** then **multiplication** followed by **addition** and then **subtraction.**

You can remember this sequence by: **Dear Mother And Sister**

Look at the title of this unit.

It says – **Dear Mother And Sister.**

The first letters **DMAS** are in the order in which operations are performed.

D stands for division. M for multiplication, A for addition and S for subtraction.

Let us now solve the numerical expression on the previous page according to the DMAS rule.

$16 + 12 \div 4 \times 5 - 2$

1. Division is performed first	$16 + (12 \div 4) \times 5 - 2$	$= 16 + 3 \times 5 - 2$
2. Followed by multiplication	$16 + (3 \times 5) - 2$	$= 16 + 15 - 2$
3. Addition comes next	$(16 + 15) - 2$	$= 31 - 2$
4. Subtraction comes last	$31 - 2$	$= 29$

Answer : 29

If any operation is missing, we skip to the next operation.

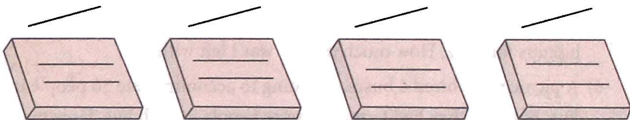
Exercise 2.9 : Simplify

1) $20 + 16 \div 2$
2) $28 - 16 \div 4$
3) $18 \div 3 - 2$
4) $12 \div 4 + 2$
5) $\frac{1}{2} \times \frac{1}{3} + \frac{1}{4}$
6) $\frac{3}{4} \times \frac{4}{9} - \frac{1}{8}$
7) $\frac{3}{7} \div \frac{1}{14} \times \frac{1}{6}$
8) $\frac{4}{7} - \frac{1}{7} \times \frac{2}{3}$
9) $4\frac{1}{4} \div \frac{17}{16} + \frac{1}{2}$
10) $\frac{5}{2} \times \frac{2}{3} + \frac{1}{3} \times \frac{1}{4}$
11) $3\frac{2}{3} \times \frac{5}{6} + \frac{2}{7} - \frac{5}{9}$

- **Brackets**

Maths Lab Activity 1





Take 4 boxes and put 2 counters in each box. Now put 1 more counter in each of the 4 boxes.

Count the total number of counters in the 4 boxes. Is it $4 \times (2 + 1)$ or $(4 \times 2) + 1$?

You will find that it is $4 \times (2 + 1) = 12$.

We write $(2 + 1)$ in brackets to show that 2 and 1 are added first before we multiply the result by 4, the number of boxes.

Now put 2 counters in each of the 4 boxes, put all the counters together and then add 1 more counter. How many counters now? You will find that there are $(4 \times 2) + 1 = 9$ counters.

We see that $4 \times (2 + 1)$ is different from $(4 \times 2) + 1$.

Exercise 2.10

A. Solve

1) $(5 \times 2) + 7$	2) $5 \times (2 + 7)$	3) $(4 \times 5) + 2$	4) $4 \times (5 + 2)$
5) $(4 \times 3) + 5$	6) $4 \times (3 + 5)$	7) $3 + (4 \times 2)$	8) $(3 + 4) \times 2$

B. Solve

1) $(9 - 1) \times 12$	2) $9 - (1 \times 2)$	3) $4 \times (5 - 2)$	4) $(4 \times 5) - 2$
5) $(3 \times 4) - 2$	6) $3 \times (4 - 2)$	7) $5 - (2 \times 2)$	8) $(5 - 2) \times 2$

C. Write the equation for each of the following situations and solve the problems.

1) Mother arranged 5 rows with 3 cups and saucers in each row. She then put on the table 2 more sets of cups and saucers. How many sets of cups and saucers were there on the table?
2) At a sale of children's books, books which normally cost ₹ 5 were reduced by ₹ 2. If Ram bought 10 books, what did he have to pay?
3) Govinda worked 4 hours in the morning and 3 hours in the afternoon in his office. If his office is open 5 days in a week, how many hours did he work in a week?
4) In a week a school bought 3 boxes of chalk, each containing 100 pieces of chalk. At the end of the week, 25 chalk pieces were left. How many were used during the week?
5) I took a hundred rupee note to the shop, bought chocolates for ₹ 48 and biscuits for ₹ 12. How much money was I left with?
6) A picnic party hired 4 buses, planning to accommodate 56 people in one bus. But then they had to put 24 more people in each bus. How many people went on the picnic?

When brackets are present in a problem, we simplify the terms inside the brackets first.

There are 3 kinds of brackets.

( ) : the round brackets.

{ } : the double or curly brackets.

[ ] : the square brackets.

If two or more types of brackets are present in a problem, the order of working is (i) round, (ii) curly and (iii) square.

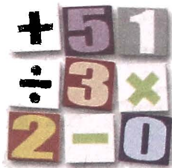


Example 1 : $100 - [88 - \{56 + (32 - 16)\}]$

$= 100 - [88 - \{56 + 16\}]$

$= 100 - [88 - 72]$

$= 100 - 16 = 84$ **Answer :** 84



Example 2 : $4\frac{6}{8} - \{ 3\frac{1}{3} + (2\frac{1}{2} - 1\frac{1}{4})\}$

$= 4\frac{6}{8} - \{ \frac{10}{3} + (\frac{5}{2} - \frac{5}{4})\}$

$= \frac{38}{8} - \{ \frac{10}{3} + \frac{5}{4} \} = \frac{38}{8} - \{ \frac{40 + 15}{12} \}$

$= \frac{38}{8} - \frac{55}{12} = \frac{114 - 110}{24} = \frac{4}{24} = \frac{1}{6}$ **Answer :** $\frac{1}{6}$

Exercise 2.11

A. Simplify

1) $\frac{7}{9} \times (\frac{1}{2} + \frac{3}{7})$
2) $\frac{5}{6} - (\frac{2}{3} - \frac{1}{4})$
3) $\frac{3}{5} \div (\frac{2}{3} - \frac{1}{5})$
4) $\frac{3}{2} \times (\frac{7}{12} \div \frac{1}{6})$
5) $(\frac{1}{4} + \frac{1}{3}) - (\frac{1}{5} + \frac{1}{6})$
6) $4\frac{2}{3} - 1\frac{1}{3} + (2\frac{2}{5} \div 1\frac{1}{5})$
7) $(\frac{5}{8} - \frac{1}{3}) \times (\frac{1}{2} - \frac{1}{4})$

B. Simplify

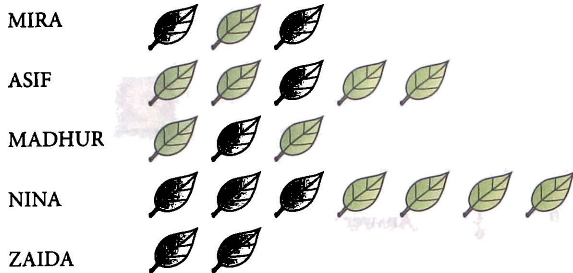
[Note : If a number is put outside a bracket with no sign between the number and the bracket, it means multiplication. Thus 2 (3 + 4) = 2 × (3 + 4)

1) $\frac{1}{4} \div \{\frac{5}{6} - (\frac{1}{2} - \frac{1}{3})\}$
2) $\frac{1}{2} \div \{2\frac{1}{4} - (\frac{1}{3} + \frac{1}{2})\}$
3) $\frac{3}{4} \times \{\frac{5}{6} - (\frac{2}{3} - \frac{1}{6})\}$
4) $4 - [2\frac{1}{2} - \{\frac{1}{3} + (\frac{1}{6} + \frac{1}{4} - \frac{1}{12})\}]$
5) $2\,\{13 + \{12 + 11\,(10 - 8)\}]$
6) $2\frac{1}{5}\,[33\frac{1}{2} - \{10\frac{1}{2} + 11(4\frac{3}{11} - 2\frac{2}{11})\}]$

• Averages

Five students of Class V collect leaf specimens for their nature study project.

The picture chart shows the number of leaf specimens collected by each student.



What is the total number of leaf specimens collected by them? Is it 20?

The chart shows that each student has collected a different number of leaf specimens.
If they had all collected the same number, the chart would have shown it like this.



Each student would have collected 4 leaves.

Is the total number of leaf specimens collected still 20? Yes, it is.

We may thus say that the students collected **an average of 4 leaves each.**

To find the average of a group of numbers, we

(i) find the sum of all the numbers in the group, and

(ii) divide the sum thus obtained by the number of addends.

Example 1 : The monthly incomes of Ramlal, a labourer, for a year are given below.

Months	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
₹	560	430	480	350	410	520	490	320	640	480	370	242

His total income for the 12 months

= ₹ (560 + 430 + 480 + 350 + 410 + 520 + 490 + 320 + 640 + 480 + 370 + 242)

= ₹ 5292

We find his average monthly income by dividing his total income by the number of months in a year, i.e. by dividing ₹ 5292 by 12.

Ramlal's average income per month is ₹ 5292 ÷ 12 = ₹ 441.

Thus we may think of Ramlal's monthly income as ₹ 441.

Example 2 : Find the average of 5, 10, 15.

Sum of the given numbers = 5 + 10 + 15 = 30

Number of addends = 3

The average of the given numbers = 30 ÷ 3 = 10

Example 3 : A train travels 35 km in the first hour, 30 km in the second hour, 50 km in the third hour and 45 km in the fourth hour. Find the average speed of the train per hour.

Total distance travelled by the train = 35 km + 30 km + 50 km + 45 km

= 160 km

Time taken to travel 160 km = 4 hours

Average speed = 160 km ÷ 4 hours

= 40 km per hour

Application— Life skill

Why do we need averages?

An average is a single value representing a group of numbers. It gives us an idea of the standard of the group.

Thus we can compare different groups by comparing their averages.

Study the following example.

Example

The test marks in Mathematics of 5 top students in section A and section B of Class V are given below. Which group has performed better?

	Section A	Section B
	100	99
	99	99
	98	98
	97	98
	91	91
Total	485	485

Average marks of

Section A = $\frac{\text{Total mark}}{\text{Total number of students}}$

$= \frac{485}{5} = 97$

Average marks of section A = 97

Average marks of

Section B = $\frac{\text{Total mark}}{\text{Total number of students}}$

$= \frac{485}{5} = 97$

Average marks of section B = 97

What do you observe?

Average marks of students in both sections = 97

Thus by calculating and comparing average marks we find that the students in both sections performed equally well. But this was not clear when we compared the individual marks obtained by the students.

Exercise 2.12

1) Attendance of pupils of a class is as follows. Monday 42, Tuesday 43, Wednesday 39, Thursday 41, Friday 45. Find the average daily attendance of the class.

2) The rainfall recorded in Delhi from July to December is as follows. Find the average rainfall for these 6 months: 3.1 cm, 4.2 cm, 5.8 cm, 11.1 cm, 4.6 cm, 7.8 cm.

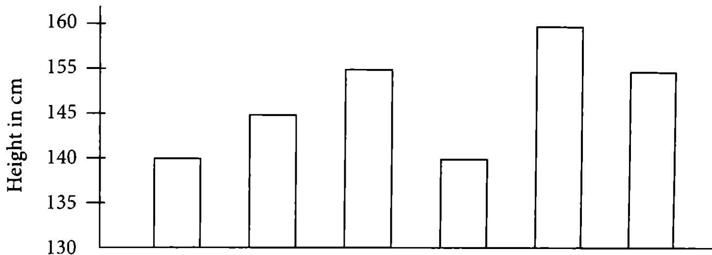
3) The weekly consumption of milk in 4 weeks by two families is given below. Compare the quantities of milk consumed by the two families.

	Week 1	Week 2	Week 3	Week 4
Family 1	16 ℓ	15 ℓ	17 ℓ	14 ℓ
Family 2	15 ℓ	20 ℓ	16 ℓ	13 ℓ

4) The daily temperatures (in Celsius) of two towns recorded for a week in the month of June are given below. Which town was cooler during the week?

	Mon	Tue	Wed	Thurs	Fri	Sat	Sun
Town A	34°C	36°C	29°C	38°C	40°C	37°C	38°C
Town B	40°C	39°C	41°C	42°C	42°C	40°C	36°C

5)



The bar graph shows the heights of 6 children in a group. Read their heights and find the average height. How many children are (a) taller (b) shorter than the average height?

6) In five one-day matches Sachin scored the following runs : 126, 38, 56, 82, 123. Find his batting average.

7) Find the average of the first ten counting numbers.

8) Find the average of the first six multiples of 2.

9) In a factory, 6 workers get a monthly salary of ₹ 1250 each, and 9 other workers get a monthly salary of ₹ 1500 each. Find the average salary of a worker.

10) The number of students in six sections of Class V in a school are 42, 45, 46, 44, 43 and 44. Find the average number of students in a section.



Maths Lab Activity 2—Project

1. Collect data of the heights of six of your classmates and find the average height.

Name						
Height (cm)						

Average height : ________ cm

2. Collect data of the age of five of your classmates and find the average age.

Name						
Age (years)						

Average age : ________ years

3. Collect data of the weight of ten of your classmates and find the average weight.

Name						
Weight (kg)						

Average weight : ________ kg

4. Collect data of the temperature during the days of a week and find the average temperature.

Day of the week						
Temperature (°C)						

Average temperature : ________ °C

• Unitary Method

If you are given the cost of one object, how do you find the cost of many objects?
We do this by multiplying the cost of one object with the number of objects.

Example 1 : The cost of 1 pen is ₹ 15. What is the cost of 5 pens?

Cost of 5 pens = Cost of 1 pen × 5

= ₹ 15 × 5

= ₹ 75

If you are given the cost of several objects how do you find the cost of one object?
We do this by dividing the cost of several objects by the number of objects.

Example 2 : The cost of 5 pens is ₹ 75. What is the cost of 1 pen?

Cost of 1 pen = Cost of 5 pens ÷ 5

= ₹ 75 ÷ 5

= ₹ 15

Now look at this problem.

Example 3 : The cost of 7 pens is ₹ 105. Find the cost of 5 pens.

We do this problem in two steps.

Step 1 : Find the cost of 1 pen

Cost of 1 pen = Cost of 7 pens ÷ 7

= ₹ 105 ÷ 7

= ₹ 15

Step 2 : Find the cost of 5 pens

Cost of 5 pens = Cost of 1 pen × 5

= ₹ 15 × 5

= ₹ 75

This method of first finding the cost of one object and then the cost of many objects is called the unitary method.



Example 4 : The distance covered by a car in 13 hours is 663 km. What is the distance covered by the car in 5 hours?

Distance covered by the car in 13 hours = 663 km

Distance covered by the car in 1 hour = 663 ÷ 13

= 51 km

Distance covered by the car in 5 hours = 51 × 5

= 255 km

Example 5 : In a Maths test paper there were 10 questions. The total marks were 25. Shiela got 6 questions right. How many marks did she get?

Marks for 10 questions	=	25
Marks for 1 question	=	______ ÷ ______
	=	______
Marks for 6 questions	=	______ × ______
	=	______

Example 6 : Rakesh read 260 pages of a book in 5 hours. If the book has a total of 416 pages, how many hours will he take to read the whole book?

260 pages of the book are read in 5 hours

1 page of the book is read in $\frac{5}{260}$ hours

416 pages of the book are read in $\frac{5}{260} \times 416$ hours

= ______ hours

Example 7 *: 6 men finish constructing a house in 30 days. In how many days will the house be constructed if 9 men are employed?

(Note that 1 man will take **more time** to finish the work than 6 men.)

6 men finish the house in 30 days

1 man will finish the house in 6 × 30 days = 180 days

(why 6 × 30 and not 30 ÷ 6?)

9 men will finish the house in 180 ÷ 9 days = 20 days

(why 180 ÷ 9 and not 180 × 9?)

Exercise 2.13

1) The price of a dozen exercise books is ₹ 72. Find the cost of 18 exercise books.

2) 18 buses carry 936 passengers. How many passengers will 25 buses carry?

3) The cost of 12 m of cloth is ₹ 480. Find the cost of 8 m of cloth.

4) The weight of 25 bags of sugar is 625 kg. Find the weight of 100 bags of sugar.

5) The train fare from Chennai to Mumbai for 6 persons is ₹ 1122.
What is the fare for 10 persons?

* Optional exercise

6) 12 kg of potatoes cost ₹ 84. How much will Mr Bhaskar have to pay if he wants only 5 kg of potatoes?

7) The rent of a house is ₹ 18,000 per year. What is the rent for 8 months?

8) The cost of a tray containing 24 eggs is ₹ 42. Find the cost of 8 eggs.

9) Bindu reads 125 pages of a book in 5 hours. In how many hours will she finish the book if it has 275 pages?

10) Raju painted 51 m of a fence in 6 days. How much did he paint in the first 4 days?

11) Mr Rao has a family of 5. He spends ₹ 1650 per month on food.
Mr Srivastava has a family of 8. If both families eat the same kind of food, how much does Mr Srivastava spend on food?

12) In a factory, 20 workers make 360 toys in a day, working 8 hours a day.
Find the number of toys made in a day if

(i) 5 workers are on leave.

(ii) all workers are present and the working hours are increased from 8 to 12 hours a day.

13)* 6 carpenters take 18 days to make a wooden cabinet. If the work is to be finished in 6 days, how many carpenters will be needed?

14)* 8 persons take 12 days to dig a well. How many days will 12 persons take to dig 2 wells?

* Optional exercise



MCQs

Tick the corect statement

1. To check the answer in division : Dividend =
   a) Divisor × Remainder + Quotient
   b) Quotient × Remainder + Divisor
   c) Divisor × Quotient + Remainder
   d) Divisor × Quotient ÷ Remainder

2. We perform operations in the following order:
   a) We add then subtract followed by multiplication and division
   b) We subtract then add followed by multiplication and division
   c) We multiply then divide followed by addition and subtraction
   d) We divide then multiply followed by addition and subtraction
3. The weight of 10 books is 5 kg. What is the weight of 16 books?

   a) 8 kg b) 32 kg c) 16 kg d) 50 kg
4. If 1 dozen bananas cost ₹ 6, the cost of 3 bananas is:

   a) 18 paise b) ₹ 2 c) ₹ 1.50 d) ₹ 3
5. The product of 1 and any number is

   a) One b) The number itself c) Zero

Hots questions

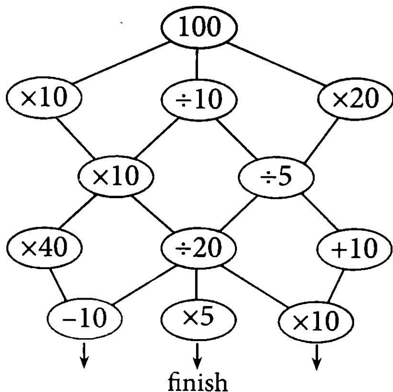
1. The product of two numbers is 1,54,344. If one of them is 236, find the other.
2. In a city 69300 kg of garbage is produced every day. One garbage truck can carry 55 kg of garbage at a time and each truck can make 10 trips in a day. How many trucks will be required to clear the garbage every day?

   (*Hint:* 1 garbage truck can carry 55 × 10 kg every day)
3. Simplify: $1\frac{5}{6} + [4\frac{2}{3} - \{5\frac{1}{3}\,(5\frac{3}{4} \div 23)\}] - 5\frac{1}{6}$
4. 6 people dig a trench in 36 hours. If the number of people is increased to 9, how many hours will it take them to dig the trench?

Fun activity

Begin from 100 and move along any path in any direction to reach the finish.

Write your highest score ______



Factors and Multiples

3

Learning Objectives



You will be able to:

- find out HCF and LCM of two or more numbers.
- test divisibility of a number by 2, 3, 4, 5, 8, 9, 10, 11.
- derive tests of divisibility by 6, 12, 15, etc.

Warm Up



- **Recall**

You have already read about factors, multiples, and prime and composite numbers.

The factors of a number are those which divide the number without leaving any remainder.

A number is a **multiple** of another number when it is exactly divisible by the other number.

Since $2 \times 3 = 6$, $6 \div 2 = 3$ and $6 \div 3 = 2$

2 and 3 divide 6 without leaving a remainder,

Therefore 2 and 3 are **factors** of 6. 6 is a **multiple** of both 2 and 3.

Prime numbers are those which have only two factors. 1 and the number itself.

Numbers which have more than two factors are called **composite numbers.**

Thus 2, 3, 5, 7, 11, 13, 17 and 19 are the prime numbers between 1 and 20.

4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20 are the composite numbers between 1 and 20.

Note that *1 is neither composite nor prime.*

Recall exercises

1. Check if the first number is a multiple of the second number.

   (i) 63, 7 (ii) 54, 9 (iii) 53, 10 (iv) 24, 6 (v) 21, 4

2. List all the factors of the following numbers: (i) 32 (ii) 18 (iii) 67 (iv) 35 (v) 49

3. Fill in the blanks.

(i) The number ______ is a factor of every number.

(ii) Each prime number has exactly ______ factors.

(iii) ______ is a number that is neither prime nor composite.

(iv) All even numbers are divisible by ______ .

(v) Two prime numbers which differ by 2 are called ______ primes.

• Prime factors

Factors of a number which are prime are called its prime factors.

Factors of 36 are : 1, 2, 3, 4, 6, 9, 12, 18

Prime factors of 36 are : 2, 3

A number can be written as a product of its prime factors, e.g. $36 = 2 \times 2 \times 3 \times 3$

A factorisation in which every factor is prime is called prime factorisation of the number.

Here are some other examples: $48 = 2 \times 2 \times 2 \times 2 \times 3$; $21 = 3 \times 7$; $25 = 5 \times 5$

When a number is written as a product of its prime factors, it is said to be completely factorised.

Two numbers are coprime if they have only 1 as the common factor.

Thus 5 and 12 are coprime. So are 8 and 15. But 12 and 15 are not coprime.

Their common factors are 1 and 3.

Exercise 3.1

A. 1. List all prime and composite numbers between 20 and 40.

2. List the next five multiples of (i) 6 (ii) 8

3. List all the factors of (i) 72 (ii) 23

4. Write the following as a product of prime factors (i) 40 (ii) 56 (iii) 30

5. Which of these are coprimes? (i) 24, 32 (ii) 18, 12 (iii) 8, 21 (iv) 9, 16

B. State whether true or false.

(i) Every number is a multiple of itself.

(ii) Every number is a multiple of 1.

(iii) A factor of a number can be greater than the number.

(iv) All even numbers are multiples of 2.

Finding prime factors of a number

Prime factors of a number can be found by repeated division by prime numbers.

Example : Find the prime factors of a) 60 b) 84

Divide by the first prime number 2.

Go on dividing until the quotient is not divisible by 2.

Then divide by the next prime number 3, and so on.

Continue dividing until the quotient is a prime number.

$\therefore$ $60 = 2 \times 2 \times 3 \times 5$; $84 = 2 \times 2 \times 3 \times 7$

a)

2	60
2	30
3	15
	5 ↑ prime number

$60 = 2 \times 2 \times 3 \times 5$

b)

2	84
2	42
3	21
	7 ↑ prime number

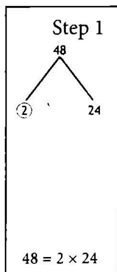
$84 = 2 \times 2 \times 3 \times 7$

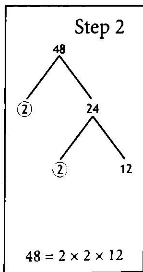
• Factor tree

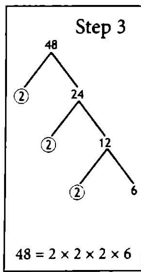
Prime factors of a number can also be found by factorising in a pictorial form, called a factor tree.

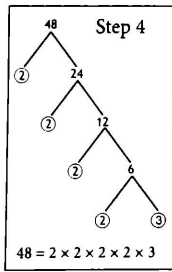
Example: Find the prime factors of 48.

Continue factorising until all factors are prime. In the factor trees below, the encircled factors are prime.









So $48 = 2 \times 2 \times 2 \times 2 \times 3$

Can you form the factor tree in another way? (*Hint* : start from $4 \times 12 = 48$ or $3 \times 16 = 48$)

Exercise 3.2

A. Find the prime factors.

1) 36 2) 64 3) 75 4) 91 5) 112 6) 120

B. Construct factor trees for: 1) 24 2) 72 3) 96 4) 120

• Highest common factor

The **highest common factor** (HCF) or **greatest common divisor** (GCD) is the greatest number which divides two or more numbers without a remainder.

Prime factor method

In Class IV you learnt the prime factor method of finding the HCF

Example 1 : Find the HCF of 44, 60 and 36.

2	44
2	22
	11

2	60
2	30
3	15
	5

2	36
2	18
3	9
	3

$44 = 2 \times 2 \times 11$

$60 = 2 \times 2 \times 3 \times 5$

$36 = 2 \times 2 \times 3 \times 3$

HCF = product of common prime factors = $2 \times 2 = 4$

Successive division method

This method is, however, too long for finding the HCF of large numbers. For this we use the **successive division method.**

Example 2 : Find the HCF of 762 and 1270.

Step 1 : Divide the bigger number by the smaller number. The remainder (508) is the first remainder.

Step 2 : Divide the first divisor (762) by the first remainder (508) to get the second remainder (254).

Step 3 : Divide the first remainder (508) by the second remainder (254).

Divisor	Dividend	Quotient	Subtracted	Remainder
762	1270	1	762	508
508	762	1	508	254
254	508	2	508	0

Continue this until the remainder is 0. The last divisor is the HCF of the two given numbers.

HCF is 254

The HCF of more than two numbers can also be found using the successive division method.

Example 3 : Find the HCF of 185, 407 and 333.

First find the HCF of 185 and 407.

```
185 | 407 | 2
      370
       37 | 185 | 5
            185
              0
```

The HCF of 185 and 407 is 37

Then find the HCF of 37 and 333

```
37 | 333 | 9
     333
       0
```

the HCF of 37 and 333 is 37

Therefore, the HCF of 185, 407 and 333 is 37.

Exercise 3.3

A. Find the HCF of the following, first by the prime factorisation method and then by the successive division method.

1) 225, 315	2) 490, 540	3) 612, 522
4) 49, 70, 77	5) 108, 144, 60	6) 106, 192, 96

B. Find the HCF of the following sets of numbers using the successive division method.

1) 684, 513	2) 603, 670	3) 320, 192
4) 230, 207	5) 470, 329	6) 290, 203, 145
7) 190, 171, 152	8) 188, 235, 282	9) 891, 1215, 1377
10) 575, 690, 920, 253	11) 510, 357, 918, 1326	12) 1683, 1584, 5049, 6633

• Lowest common multiple

The **lowest common multiple** (LCM) of two or more numbers is the smallest number which is divisible by each one of the given numbers.

Prime factorisation method

Example 1 : Find the LCM of 8, 24 and 36.

Step 1 : Find the prime factors of each number

The prime factors of 8 are $2 \times 2 \times 2$

The prime factors of 24 are $2 \times 2 \times 2 \times 3$

The prime factors of 36 are $2 \times 2 \times \quad \times 3 \times 3$

$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 3 = 72$

Step 2 : Ring all common factors. Taking only one factor out of a set of common factors, multiply all prime factors. This gives the LCM.

Division method

Example 2 : Find the LCM of 144, 96, 160

Step 1 : Write the numbers as shown. Divide all numbers by a prime number which divides at least two of the numbers.

Step 2 : Write the quotient in each case below the number. If a number cannot be divided exactly, write the number as it is in the next row.

Step 3 : Keep dividing by prime numbers until the last row has coprime numbers with no common factors.

Step 4 : Multiply all divisors and all numbers left in the last row. The product gives the LCM of the given numbers.

Divisor			
2	144,	96,	160
2	72,	48,	80
2	36,	24,	40
2	18,	12,	20
2	9,	6,	10
3	9,	3,	5
	3,	1,	5

LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 1440$

Exercise 3.4

A. Find the LCM of the following sets of numbers.

1) 108, 144
2) 72, 90
3) 39,195
4) 98, 147
5) 105, 70
6) 85, 51
7) 76, 57
8) 252, 144
9) 256, 64
10) 75,90,125
11) 93, 62, 120
12) 75, 90
13) 48, 60, 84
14) 65, 115, 130
15) 39, 52, 65
16) 255, 340, 765, 425

• LCM and HCF

There is an interesting property connecting the HCF and LCM of two numbers. What do you notice in this table?

Numbers considered	Their product	HCF	LCM	Product of HCF and LCM
6 and 9	54	3	18	54
10 and 15	150	5	30	150
12 and 16	192	4	48	192
15 and 20	300	5	60	300

The product of two numbers is equal to the product of their HCF and LCM.

First number × second number = HCF of the numbers × LCM of the numbers

Exercise 3.5

A. Complete the table below.

Numbers considered	Their product	HCF	LCM	Product of HCF and LCM
14 and 21	294			
24 and 20		4		
15 and 20			60	
33 and 22				726

B. 1) The HCF and LCM of two numbers are 48 and 288 respectively. One of the numbers is 144. Find the other number.

2) The product of two numbers is 600. Their LCM is 60. Find their HCF.

3) The HCF and LCM of two numbers are 16 and 192 respectively. One of the number is 48. What is the other number?

4) The LCM and HCF of two numbers are 2310 and 33 respectively. If one of the number is 330, find the other number.

- **Word problems**

Example 1: Find the largest number that divides 12 and 20 without a remainder.

The largest number that divides 12 and 20 without a remainder is the HCF of 12 and 20.

$12 = 2 \times 2 \times 3$

$20 = 2 \times 2 \times 5$

$HCF = 2 \times 2 = 4$ **Answer:** 4

Example 2: Find the greatest number which divides 149 and 101, leaving a remainder of 5.

The number must divide 149 and leave 5 as remainder. Therefore it must divide (149–5) that is 144 without a remainder.

The number must also divide 101 and leave 5 as remainder. Therefore it must divide (101–5) that is 96 without a remainder.

Therefore we have to find the HCF of 144 and 96.

96) 144 (1
96
48) 96 (2
96
0

Answer: 48

Example 3 : Find the smallest number which when divided by 10 and 15 leaves no remainder.

The smallest number, which when divided by 10 and 15 leaves no remainder is their LCM.

5 | 10, 15
2, 3

$LCM = 5 \times 2 \times 3 = 30$ **Answer :** 30

Example 4 : Find the smallest number which when divided by 44 and 55, leaves a remainder of 8.

The smallest number which when divided by 44 and 55 without a remainder is the LCM of 44 and 55.

$$\begin{array}{r|l} 11 & 44, 55 \\ \hline & 4, 5 \end{array} \quad LCM = 11 \times 4 \times 5 = 220$$

Therefore the smallest number which when divided by 44 and 55 leaves a remainder of 8 is 220 + 8 = 228

Answer : 228

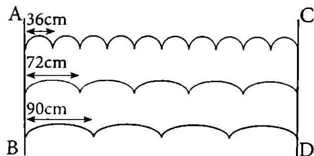
Exercise 3.6

1. Find the largest number that divides 280 and 490 without a remainder.
2. Find the largest number that divides 232 and 157 leaving a remainder of 7.
3. Find the smallest number which when divided by 72 and 90 leaves no remainder.
4. Find the smallest number which when divided by 39, 52 and 65, leaves a remainder of 5 in each case.
5. Find the smallest number which when divided by 42 or 147 leaves a remainder of 5 in each case.
6. Find the smallest number which, on adding 10 to it, is exactly divisible by 28, 36 and 45.
7. In a school the duration of a class in the primary section is 40 minutes and in the secondary section it is 1 hour. If both section begin school at 10 a.m. when will the two bells ring together again?
8. Three bells ring at intervals of 7, 10 and 14 minutes respectively. They begin by ringing together. After how long will they ring together again?
9. Find the largest number that divides 249 and 309 leaving a remainder of 9.
10. Three children are walking. Their steps measure 36 cm, 72 cm and 90 cm. If they step from a line AB, their steps will fall together again at line CD. What is the distance between AB and CD?



Maths Lab Activity 1

See the diagram that illustrates Q.10.
Can you draw similar diagrams for Q.7 and 8?



- **Tests of divisibility**

You have studied in class IV about simple tests of divisibility by 2, 3, 4, 5, 9, 10. Let us revise these and learn about some other tests of divisibility.

1. A number is divisible by 2 if it has 0 or an even number in its ones place.

   Thus 380, 4812, 4344, 56, 388 are divisible by 2.

   381, 4813, 4345, 57, 389 are not divisible by 2.

2. A number is divisible by 3 if the sum of its digits is divisible by 3.

   Thus 462 is divisible by 3 since 4 + 6 + 2 = 12 is divisible by 3.

   461 is not divisible by 3 since 4 + 6 + 1 = 11 is not divisible by 3.

3. A number is divisible by 4 if the number formed by the tens and ones digits is divisible by 4.

   3652 is divisible by 4 since 52 is divisible by 4.

   3654 is not divisible by 4 since 54 is not divisible by 4.

4. A number is divisible by 5 if it has 0 or 5 in its ones place.

   2340, 4845 are divisible by 5. 2342, 4846 are not divisible by 5.

5. A number is divisible by 10 if it has 0 in its ones place.

   3840, 485030 are divisible by 10. 3845, 485032 are not divisible by 10.

6. A number is divisible by 9 if the sum of its digits is divisible by 9.

   Thus 3843 is divisible by 9 since 3 + 8 + 4 + 3 = 18 is divisible by 9.

   3849 is not divisible by 9 since 3 + 8 + 4 + 9 = 24 is not divisible by 9.

7. A number is divisible by 15 if it is divisible by both 3 and 5.

   14265 is divisible by both 3 and 5. Therefore it is divisible by 15.

   Notice that 3 and 5 are factors of 15 and they are coprime.

   A number is divisible by another number if it is also divisible by its coprime factors.

   Thus a number is

   - divisible by 6 if it is divisible by both 2 and 3
   - divisible by 10 if it is divisible by both 2 and 5
   - divisible by 12 if it is divisible by both 3 and 4

   In this way you can make divisibility rules of your own.

8. If a number is divisible by another number, it is also divisible by each factor of that number.

   264 is divisible by 12. Therefore 264 is also divisible by the factors of 12, i.e. by 2, 3, 4, and 6. You can check this yourself.

Exercise 3.7

A. Check divisibility by 2, 3, 4, 5, 6, 9, 10, 12 and 15. Put a ✓ for divisible and a ✗ for not divisible.

Number	2	3	4	5	6	9	10	12	15
1) 6225									
2) 4644									
3) 66660									
4) 726354									
5) 54795									

B. Check if the first number is divisible by the second.

In each of these cases you have to form your own divisibility rules by using the coprime factors rule (Rule 7 on the previous page)

1) 63405 by 18 (*Hint* : coprime factors of 18 are 2 and 9)
2) 5656800 by 24 (*Hint* : coprime factors of 24 are 3 and ____)
3) 486420 by 30 (Coprime factors of 30 are ____ and ____)
4) 1273490 by 40 (Coprime factors of 40 are ____ and ____)
5) 2001123 by 36 (Coprime factors of 36 are ____ and ____)

C. Fill in the blanks.

1) A number is divisible by 24. It will also be divisible by ____, ____, ____, ____, ____, and ____.
2) A number is divisible by 30. It will also be divisible by ____, ____, ____, ____, ____, and ____.
3) A number which is divisible by 50 is also divisible by ____, ____, ____ and ____.
4) A number which is divisible by 25 is also divisible by the number ____.

D. Write true or false.

1) If a number is divisible by 6, it must be divisible by 12.
2) If a number is divisible by 6, it must be divisible by 3.
3) If a number is divisible by 100, it must be divisible by 25.
4) A number divisible by 256 is even.
5) 11 and 6 are coprime numbers. If a number is divisible by both 11 and 6, it is also divisible by 66.

WORKSHEET
for formative assessment



MCQs

1. The prime factorisation of 36 is _______ .

   a) 2 × 2 × 2 × 3 b) 2 × 3 × 3 × 3 c) 2 × 2 × 3 × 3 d) 2 × 2 × 2 × 2

2. The largest number which is a factor of 45 and 150 is _______ .

   a) 5 b) 15 c) 3 d) 20

3. A number is divisible by 32, it will also be divisible by

   a) 2 b) 4 c) 8 d) 2 ,4, and 8

4. A factory has 45558 employees. The same number of employees works in each shift. How many shifts does the factory have? (*Hint* : use divisibility rules)

   a) 5 b) 10 c) 9 d) 4

5. 61806 students voted in the student council election. Each candidate got exactly the same number of votes. How many candidates were contesting?

   a) 5 b) 10 c) 9 d) 6

Hots questions

1. Find all two-digit numbers which satisfy the following conditions.

   a) It is divisible by 9
   b) It is an even number
   c) It is not divisible by 5
   d) Two of its factors are co-prime.

2. Find the number which has the first 6 prime numbers as its only factors.

3. How many 2-digit numbers satisfy the following conditions?

   a) If divided by 3, the remainder is 0.
   b) If divided by 7, the remainder is 1.
   c) If divided by 5, the remainder is 1.

Fun activity

Complete the 3 × 3 magic square with the magic sum 15, using numbers from 1 to 9.

2		
	5	
		8

Fractions

4

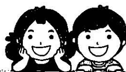
Learning Objectives



You will be able to:

- add and subtract fractional numbers.
- carry out multiplication and division of fractional numbers.

Warm Up



- **Recall**

Let us revise some important facts about fractions we have learnt in earlier classes.

1. **Equivalent fractions :** If the numerator and denominator of a fraction are multiplied or divided by the same whole number (not zero), we get a fraction which is equivalent to the given fraction.

   $\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$

   $\frac{12}{16} = \frac{12 \div 2}{16 \div 2} = \frac{6}{8} = \frac{12 \div 4}{16 \div 4} = \frac{3}{4}$

   Fractions are equivalent if the cross products of the numerator of one fraction with the denominator of the other, are equal.

   $\frac{1}{2} \times \frac{3}{6}$ $\quad 1 \times 6 = 2 \times 3$

2. **Types of fractions :** Fractions with the same denominator are like fractions. $\frac{1}{9}, \frac{2}{9}, \frac{5}{9}$ are like fractions.

   Fractions with different denominators are **unlike fractions.** $\frac{2}{5}, \frac{3}{4}, \frac{8}{9}$ are unlike fractions.

   Fractions in which the numerator is greater than the denominator are called **improper fractions.** $\frac{6}{5}, \frac{4}{3}, \frac{7}{3}$ are improper fractions.

   Fractions in which the numerator is less than the denominator are known as **proper fractions.** $\frac{3}{4}, \frac{2}{5}, \frac{6}{12}$ are proper fractions.

   Fractions such as $1\frac{1}{4}$ which are combination of whole numbers and fractions are called **mixed fractions or mixed numbers.**

3. **Conversion :** (a) To convert an improper fraction into a mixed fraction, divide the numerator by the denominator. The quotient gives the whole number. The remainder is the numerator of the mixed fraction. The denominator remains the same.

   $\frac{7}{3}$: $7 \div 3 = 2$ rem $1 \therefore \frac{7}{3} = 2\frac{1}{3}$

b) To convert a mixed fraction into an improper fraction, multiply the denominator by the whole number and add this to the numerator. The result is the numerator of the improper fraction. The denominator remains the same.

$2\frac{3}{5}$: $2 \times 5 + 3 = 13 \quad \therefore 2\frac{3}{5} = \frac{13}{5}$

Recall exercise

1) Express as improper fractions : $4\frac{1}{2}$, $3\frac{1}{3}$, $2\frac{1}{4}$, $5\frac{7}{8}$

2) Express as mixed fractions : $\frac{19}{2}$, $\frac{14}{7}$, $\frac{13}{6}$, $\frac{11}{4}$

3) Express as equivalent fractions in their lowest terms : $\frac{2}{16}$, $\frac{18}{27}$, $\frac{15}{25}$, $\frac{10}{20}$

• Addition and subtraction of fractions

Example 1 : $\frac{3}{8} + \frac{2}{8}$

Since denominators are the same, we simply add the numerators.

$\frac{3}{8} + \frac{2}{8} = \frac{3+2}{8} = \frac{5}{8}$ **Answer :** $\frac{5}{8}$

Example 2 : $\frac{1}{3} + \frac{1}{5}$

The denominators are different. We need to find equivalent fractions with a common denominator. The common denominator can be the LCM of the denominators.

LCM of 3 and 5 is 15; $\frac{1}{3} = \frac{5}{15}$ and $\frac{1}{5} = \frac{3}{15}$

Therefore $\frac{1}{3} + \frac{1}{5} = \frac{5}{15} + \frac{3}{15} = \frac{8}{15}$ **Answer :** $\frac{8}{15}$

Example 3 : Add $3\frac{3}{4}$ and $2\frac{1}{8}$

This can be done in two ways.

First method : Add the whole numbers and fractions separately.

$3\frac{3}{4} + 2\frac{1}{8} = 3 + 2 + \frac{3}{4} + \frac{1}{8}$

$3 + 2 = 5$

$\frac{3}{4} + \frac{1}{8} = \frac{6}{8} + \frac{1}{8} = \frac{7}{8}$

Therefore $3\frac{3}{4} + 2\frac{1}{8} = 5 + \frac{7}{8}$

$= 5\frac{7}{8}$

Answer : $= 5\frac{7}{8}$

Second method : Convert the mixed fractions into improper fractions.

$3\frac{3}{4} = \frac{15}{4}$ and $2\frac{1}{8} = \frac{17}{8}$

LCM of 4 and 8 is 8. Therefore

$\frac{15}{4} + \frac{17}{8} = \frac{30}{8} + \frac{17}{8} = \frac{47}{8}$

Converting back to mixed fraction

$\frac{47}{8} = 5\frac{7}{8}$

Answer : $= 5\frac{7}{8}$

Example 4 : $\frac{6}{7} - \frac{3}{7}$

Since the denominators are the same $\frac{6}{7} - \frac{3}{7} = \frac{6-3}{7} = \frac{3}{7}$ **Answer:** $= \frac{3}{7}$

Example 5 : $\frac{3}{5} - \frac{1}{4}$

LCM of the denominators 5 and 4 is 20

$\frac{3}{5} = \frac{12}{20}$ and $\frac{1}{4} = \frac{5}{20}$

Therefore $\frac{3}{5} - \frac{1}{4} = \frac{12}{20} - \frac{5}{20} = \frac{7}{20}$ **Answer :** $\frac{7}{20}$

Example 6 : $\frac{3}{4} - \frac{1}{8} + \frac{1}{6}$

LCM of 4, 8, 6 is 24

$\frac{3}{4} - \frac{1}{8} + \frac{1}{6} = \frac{18}{24} - \frac{3}{24} + \frac{4}{24}$

$\frac{18-3+4}{24} = \frac{19}{24}$ **Answer :** $\frac{19}{24}$

Example 7 : $5\frac{2}{3} - 2\frac{1}{2}$

Convert both into improper fractions : $5\frac{2}{3} = \frac{17}{3}$; $2\frac{1}{2} = \frac{5}{2}$

LCM of 3 and 2 is 6. $\frac{17}{3} = \frac{34}{6}$ and $\frac{5}{2} = \frac{15}{6}$

$5\frac{2}{3} - 2\frac{1}{2} = \frac{17}{3} - \frac{5}{2}$

$= \frac{34}{6} - \frac{15}{6} = \frac{19}{6}$

Converting back to mixed fraction $\frac{19}{6} = 3\frac{1}{6}$ **Answer :** $3\frac{1}{6}$

Example 8 : $2\frac{2}{3} - 1\frac{1}{4} + 3\frac{1}{6}$

$2\frac{2}{3} - 1\frac{1}{4} + 3\frac{1}{6} = \frac{8}{3} - \frac{5}{4} + \frac{19}{6}$

$= \frac{32-15+38}{12} = \frac{55}{12} = 4\frac{7}{12}$ **Answer :** $4\frac{7}{12}$





Exercise 4.1

A. Add or subtract as required.

1) $\frac{3}{7}+\frac{2}{7}$

2) $\frac{1}{5}+\frac{2}{5}$

3) $\frac{1}{11}+\frac{7}{11}+\frac{2}{11}$

4) $\frac{3}{37}+\frac{12}{37}+\frac{13}{37}$

5) $\frac{5}{7}-\frac{2}{7}$

6) $\frac{6}{11}-\frac{2}{11}$

7) $\frac{11}{101}-\frac{1}{101}$

8) $\frac{5}{13}-\frac{2}{13}$

B. Add

1) $\frac{2}{5}, \frac{3}{4}, \frac{1}{2}$

2) $\frac{5}{8}, \frac{3}{4}, \frac{1}{2}$

3) $\frac{1}{4}, \frac{1}{5}, \frac{1}{3}$

4) $\frac{1}{16}, \frac{3}{8}, \frac{1}{2}$

5) $5\frac{2}{3}, 2\frac{1}{3}$

6) $1\frac{5}{8}, 2\frac{2}{12}$

7) $2\frac{2}{3}, 1\frac{4}{9}$

8) $5\frac{2}{9}, 2\frac{1}{12}$

9) $5\frac{5}{6}, 6\frac{11}{24}, 1\frac{3}{16}$

10) $\frac{9}{16}, 2\frac{7}{24}, \frac{13}{8}$

11) $1\frac{3}{12}, 2\frac{2}{16}, 3\frac{3}{24}$

C. Subtract

1) $\frac{2}{3}-\frac{2}{7}$

2) $\frac{5}{8}-\frac{1}{6}$

3) $\frac{5}{7}-\frac{5}{8}$

4) $\frac{3}{4}-\frac{9}{15}$

5) $2-\frac{1}{5}$

6) $1-\frac{3}{7}$

7) $5-\frac{5}{9}$

8) $3-\frac{1}{3}$

9) $1\frac{3}{4}-1\frac{1}{2}$

10) $3\frac{1}{2}-2\frac{1}{4}$

11) $6\frac{5}{8}-2\frac{3}{4}$

12) $3\frac{5}{12}-1\frac{1}{2}$

D. Simplify

1) $\frac{2}{3}-\frac{5}{6}+\frac{5}{12}$

2) $\frac{1}{3}-\frac{1}{2}+\frac{7}{12}$

3) $\frac{5}{6}+\frac{1}{2}-\frac{1}{4}$

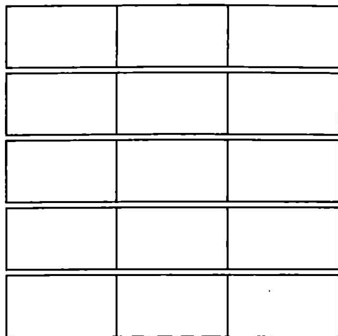
4) $\frac{7}{8}+\frac{3}{4}-\frac{1}{2}$

5) $2\frac{2}{3}-2\frac{1}{6}+1\frac{5}{12}$

6) $2\frac{1}{2}-2\frac{3}{4}+1\frac{5}{8}$

• Multiplication of a fractional number by a whole number

Multiply $\frac{2}{3}$ by 5.



Each rectangular strip respresent one unit.

The shaded portion in each strip is $\frac{2}{3}$.

The shaded parts considered altogether

$= \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$ or

$= \frac{2}{3} \times 5$

$= \frac{10}{3}$

This can be done by a short method.

$\frac{2}{3} \times 5 = \frac{2 \times 5}{3} = \frac{10}{3}$

The numerator of the fraction is multiplied by the multiplier.
The denominator remains the same.

Exercise 4.2

Multiply

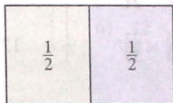
1) $\frac{4}{7} \times 6$	2) $\frac{2}{7} \times 9$	3) $\frac{7}{9} \times 10$	4) $\frac{5}{11} \times 9$
5) $\frac{2}{5} \times 10$	6) $\frac{3}{7} \times 5$	7) $\frac{6}{7} \times 4$	8) $\frac{3}{7} \times 3$
9) $\frac{7}{91} \times 6$	10) $\frac{7}{9} \times 5$	11) $\frac{2}{11} \times 8$	12) $\frac{3}{14} \times 7$
13) $\frac{5}{16} \times 9$	14) $\frac{1}{10} \times 17$	15) $\frac{3}{20} \times 0$	16) $\frac{6}{11} \times 1$
17) $\frac{2}{24} \times 6$	18) $\frac{5}{6} \times 0$	19) $\frac{7}{10} \times 1$	20) $\frac{3}{4} \times 8$

- **Multiplication of a fractional number by a fractional number**

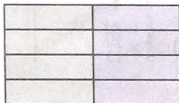


Maths Lab Activity 1

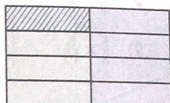
Multiply $\frac{1}{4}$ and $\frac{1}{2}$



(a) Fold a rectangle into halves as shown.



(b) Fold it the other way into fourths.



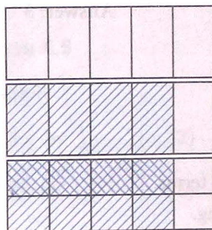
(c) Shade the area $\frac{1}{4}$ of $\frac{1}{2}$ $(\frac{1}{4} \times \frac{1}{2})$

The shaded area in (c) represents 1 out of 8 equal parts, that is $\frac{1}{8}$

Therefore $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

Example 2 : Multiply $\frac{1}{2}$ and $\frac{4}{5}$.

Look at the following figures.



If this represents a whole then

this shaded part is $\frac{4}{5}$ of the whole and

the shaded part here represents $\frac{1}{2}$ of $\frac{4}{5}$, or $\frac{4}{10}$ of the whole

We therefore have, $\frac{1}{2} \times \frac{4}{5} = \frac{1 \times 4}{2 \times 5} = \frac{4}{10}$

On simplification we get $\frac{4}{10} = \frac{4 \div 2}{10 \div 2} = \frac{2}{5}$

Hence, in the multiplication of two fractions we

(i) multiply the numerators of the two fractions.

(ii) multiply the denominators of the two fractions.

(iii) write the product of the numerators over the product of the denominators and simplify to the lowest terms.



Exercise 4.3 : Find the product

1) $\frac{2}{5} \times \frac{1}{8}$	2) $\frac{3}{4} \times \frac{1}{7}$	3) $\frac{3}{5} \times \frac{2}{3}$	4) $\frac{2}{11} \times \frac{3}{4}$
5) $\frac{1}{5} \times \frac{3}{4}$	6) $\frac{7}{7} \times \frac{3}{4}$	7) $\frac{7}{9} \times \frac{1}{21}$	8) $\frac{4}{9} \times \frac{3}{8}$
9) $\frac{5}{8} \times \frac{8}{15}$	10) $\frac{4}{5} \times \frac{10}{13}$	11) $\frac{26}{33} \times \frac{22}{39}$	12) $\frac{15}{49} \times \frac{14}{45}$

• Multiplication of a whole number by a fractional number

Example 1 : Multiply 6 by $\frac{1}{2}$.

Consider the following rectangular strips.

If [six-part strip] represents 6, then

[three-part strip] represents $\frac{1}{2}$ of 6, or 3.

$\frac{1}{2}$ of 6 is written as $6 \times \frac{1}{2} = \frac{6}{1} \times \frac{1}{2} = \frac{6}{2} = 3$ **Answer: 3**

Example 2 : Find $\frac{3}{4}$ of 16.

$\frac{3}{4} \times 16 = \frac{3}{4} \times \frac{16}{1} = \frac{48}{4} = 12$

We can use a shorter method to get the answer in the lowest terms.
For this we cancel out the common factors before multiplying.

$\frac{3}{\cancel{4}_1} \times \frac{\cancel{16}^4}{1}$ (Dividing by the common factor 4) $= \frac{12}{1} = 12$ **Answer: 12**

The steps in multiplication are:

(i) write the whole number as a fractional number.

(ii) multiply the numerators of the fractions.

(iii) multiply the denominators of the fractions.

(iv) simplify to the lowest terms.



Exercise 4.4

A. Find the product

1) $12 \times \frac{1}{2}$
2) $14 \times \frac{1}{7}$
3) $16 \times \frac{3}{4}$
4) $15 \times \frac{2}{5}$
5) $10 \times \frac{3}{5}$
6) $12 \times \frac{2}{3}$
7) $18 \times \frac{2}{3}$
8) $21 \times \frac{3}{7}$

B. Solve

1) $3\frac{1}{3}$ of 3
2) $5\frac{1}{5}$ of 10
3) $6\frac{2}{7}$ of 7
4) $6\frac{2}{3}$ of 1
5) $5\frac{2}{3}$ of 6
6) $1\frac{1}{5}$ of 15
7) $2\frac{2}{3}$ of 6
8) $5\frac{1}{2}$ of 4

Example 3 : Multiply $3\frac{1}{5}$ by $\frac{3}{8}$

$3\frac{1}{5} \times \frac{3}{8} = \frac{\overset{2}{\cancel{16}}}{5} \times \frac{3}{\cancel{8}_1}$ (dividing by the common factor 8)

$= \frac{2}{5} \times \frac{3}{1} = \frac{6}{5} = 1\frac{1}{5}$ **Answer :** $1\frac{1}{5}$

Exercise 4.5

A. Multiply

1) $3\frac{1}{3}$ by $\frac{1}{5}$
2) $3\frac{1}{5}$ by $\frac{1}{2}$
3) $4\frac{1}{5}$ by $\frac{3}{7}$
4) $5\frac{1}{10}$ by $\frac{3}{17}$
5) 15 by $1\frac{1}{5}$
6) $2\frac{1}{7}$ by $\frac{4}{5}$
7) $4\frac{2}{5}$ of $\frac{4}{11}$
8) $3\frac{1}{5}$ by $\frac{3}{8}$

B. Find

1) $3\frac{3}{4}$ of $6\frac{2}{5}$
2) $3\frac{3}{7}$ of $2\frac{4}{5}$
3) $3\frac{1}{5}$ of $2\frac{3}{4}$
4) $2\frac{1}{15}$ of $2\frac{1}{5}$

• Properties of multiplication of fractional numbers

The properties of multiplication of whole numbers apply to multiplication of fractions as well.

1. When we multiply two fractional numbers, the order in which we multiply does not change the result.

Consider $\frac{3}{7} \times \frac{5}{8}$

$\frac{3}{7} \times \frac{5}{8} = \frac{3 \times 5}{7 \times 8} = \frac{15}{56}$ $\quad \frac{5}{8} \times \frac{3}{7} = \frac{5 \times 3}{8 \times 7} = \frac{15}{56}$

Therefore $\frac{3}{7} \times \frac{5}{8} = \frac{5}{8} \times \frac{3}{7}$

2. When we multiply more than two fractional numbers, the way in which we group them does not change the result.

Consider $\frac{2}{5} \times \frac{1}{7} \times \frac{2}{3}$

$(\frac{2}{5} \times \frac{1}{7}) \times \frac{2}{3} = (\frac{2 \times 1}{5 \times 7}) \times \frac{2}{3} = \frac{2}{35} \times \frac{2}{3}$

$= \frac{2 \times 2}{35 \times 3} = \frac{4}{105}$

$\frac{2}{5} \times (\frac{1}{7} \times \frac{2}{3}) = \frac{2}{5} \times (\frac{1 \times 2}{7 \times 3}) = \frac{2}{5} \times \frac{2}{21}$

$= \frac{2 \times 2}{5 \times 21} = \frac{4}{105}$

Therefore $(\frac{2}{5} \times \frac{1}{7}) \times \frac{2}{3} = \frac{2}{5} \times (\frac{1}{7} \times \frac{2}{3})$

3. The product of a fractional number and 1 is the fractional number itself.

$\frac{1}{3} \times 1 = \frac{1}{3} \times \frac{1}{1} = \frac{1 \times 1}{3 \times 1} = \frac{1}{3}$

4. The product of a fractional number and 0 is 0.

$\frac{1}{3} \times 0 = \frac{1 \times 0}{3} = \frac{0}{3} = 0$

Exercise 4.6

Use properties of multiplication to fill in the following blanks.

1) $\frac{5}{8} \times \frac{2}{7} = ____ \times \frac{5}{8}$

2) $\frac{4}{6} \times ____ = \frac{1}{3} \times \frac{4}{6}$

2) $(\frac{1}{2} \times \frac{1}{3}) \times \frac{3}{4} = ____ \times (\frac{1}{3} \times \frac{3}{4})$

4) $\frac{4}{3} \times 1 = ____$

5) $\frac{1}{5} \times 0 = ____$

6) $(\frac{1}{6} \times ____) \times \frac{3}{4} = \frac{1}{6} \times (\frac{1}{2} \times \frac{3}{4})$

• Multiplication of more than two fractional numbers

Example 1 : Multiply $\frac{1}{2}, \frac{2}{5}, \frac{3}{7}$,

$$\frac{1}{2} \times \frac{2}{5} \times \frac{3}{7} = (\frac{1}{2} \times \frac{2}{5}) \times \frac{3}{7}$$

$$= \frac{2}{10} \times \frac{3}{7} = \frac{6}{70}$$

Also $\frac{1}{2} \times \frac{2}{5} \times \frac{3}{7} = \frac{1 \times 2 \times 3}{2 \times 5 \times 7} = \frac{6}{70}$

Therefore,

to multiply more than two fractional numbers, we multiply the numerators to get the numerator of the product. We multiply the denominators to get the denominator of the product.



To get the answer in the lowest terms, it is easier to cancel out the common factors before multiplying.

$$\frac{1}{2} \times \frac{2}{5} \times \frac{3}{7} = \frac{1 \times 1 \times 3}{1 \times 5 \times 7} = \frac{3}{35}$$

Example 2 : $3\frac{3}{4} \times 2\frac{2}{5} \times 1\frac{1}{3}$

$$3\frac{3}{4} \times 2\frac{2}{5} \times 1\frac{1}{3} = \frac{15}{4} \times \frac{12}{5} \times \frac{4}{3}$$

$$= \frac{15 \times 12 \times 4}{4 \times 5 \times 3} = \frac{12}{1} = 12$$

Exercise 4.7 : Simplify

1) $\frac{2}{3} \times \frac{1}{7} \times \frac{4}{5}$

2) $\frac{2}{3} \times \frac{9}{2} \times \frac{3}{5}$

3) $\frac{3}{4} \times \frac{5}{7} \times \frac{7}{5}$

4) $\frac{6}{7} \times \frac{14}{25} \times \frac{5}{8}$

5) $\frac{3}{8} \times \frac{1}{3} \times \frac{2}{7}$

6) $\frac{1}{9} \times \frac{3}{5} \times \frac{3}{4}$

7) $11\frac{2}{3} \times 3\frac{1}{2} \times 7\frac{2}{7}$

8) $4\frac{1}{2} \times 3\frac{3}{5} \times 1\frac{1}{3}$

9) $\frac{4}{7} \times 5\frac{2}{3} \times \frac{7}{17}$

10) $3\frac{2}{7} \times 1\frac{1}{23} \times 2\frac{1}{12}$

11) $4\frac{1}{2} \times 5\frac{1}{4} \times \frac{8}{21}$

12) $3\frac{3}{4} \times 1\frac{2}{5} \times 1\frac{1}{7}$

• Word problems in multiplication of fractions

Example 1 : 1 litre of milk costs ₹ $13\frac{1}{2}$. Find the cost of $\frac{1}{3}$ litre.

1 litre of milk costs ₹ $13\frac{1}{2}$

$\frac{1}{3}$ litres of milk costs $\frac{1}{3} \times$ ₹ $13\frac{1}{2}$ = ₹ $\frac{1}{\cancel{3}_1} \times \frac{\cancel{27}^9}{2}$

= ₹ $\frac{9}{2}$ = ₹ $4\frac{1}{2}$

Example 2 : Anuj has a rope $5\frac{1}{4}$ m long. He cuts off one-third of it. How long is the portion he cut off?

Anuj cuts off $\frac{1}{3}$ of $5\frac{1}{4}$ m

$\frac{1}{3}$ of $5\frac{1}{4} = \frac{1}{3} \times 5\frac{1}{4} = \frac{1}{\cancel{3}_1} \times \frac{\cancel{21}^7}{4}$ $= \frac{7}{4}$ m $= 1\frac{3}{4}$ m

Exercise 4.8 : Word problems

1. (a) Alka is getting dressed to attend her friend's birthday party. She wants to tie a ribbon around her hair. She has $\frac{3}{4}$ metre of ribbon. She cuts off $\frac{1}{3}$ of it. What part of a metre is cut off?



   (b) Her friend's house is 200 metres away. She walks $\frac{2}{5}$ th of the distance and is then picked up by a friend. How far did she walk?



   (c) Alka is quite a fast walker. Her speed is $\frac{25}{16}$ km per hour. What distance in metres can she walk in $\frac{1}{5}$ of an hour?

   (d) At the party, Alka found that only $\frac{5}{6}$ of the cake was left. She ate $\frac{1}{4}$ of it. What fraction of the cake did she eat?



   (e) They all sat down to watch the television programme for $\frac{1}{2}$ an hour. Advertisements took $\frac{1}{10}$ of the time. How many minutes was that?

2. 12 boys go to a circus. If the tickets cost ₹ $1\frac{3}{4}$ per head, how much had they to pay in all?

3. The cost of 1 kg of sweets is ₹ $5\frac{1}{2}$. What is the cost of $4\frac{1}{2}$ kg of sweets?
4. A man walks $3\frac{3}{4}$ km in 1 hour. How far does he go in $1\frac{1}{2}$ hours?
5. If 1 litre of petrol costs ₹ $7\frac{1}{2}$, what is the cost of 15 litres of petrol?
6. Mala can swim $1\frac{3}{5}$ m in 1 second. What distance can she swim in 1 minute?
7. An aeroplane flies 800 km in 1 hour. It completes the journey from Delhi to Hyderabad in $1\frac{3}{4}$ hours. What is the distance from Delhi to Hyderabad?

• Multiplicative inverse

Study the following examples.

1) $\frac{1}{3} \times \frac{3}{1} = \frac{1 \times 3}{3 \times 1} = \frac{3}{3} = 1$

2) $\frac{1}{7} \times 7 = \frac{1 \times 7}{7 \times 1} = \frac{7}{7} = 1$

3) $\frac{1}{12} \times 12 = \frac{12}{12} = 1$

In each of the above cases the product is 1.

Numbers whose product is 1 are said to be **multiplicative inverse** of each other.

Therefore,

if the product of a fractional number and a whole number is 1, then each is the multiplicative inverse of the other.



Therefore, $\frac{1}{3}$ is the multiplicative inverse of 3 and

3 is the multiplicative inverse of $\frac{1}{3}$.

Similarly $\frac{1}{7}$ is the multiplicative inverse of 7 and

7 is the multiplicative inverse of $\frac{1}{7}$.

What is the multiplicative inverse of 12? ______

Now study a few more examples.

$\frac{5}{9} \times \frac{9}{5} = \frac{5 \times 9}{9 \times 5} = \frac{45}{45} = 1$

$\frac{3}{2} \times \frac{2}{3} = \frac{3 \times 2}{2 \times 3} = \frac{6}{6} = 1$

Again, the product in each of the cases is 1.

Therefore we can say,

> if the product of two fractional numbers is 1, then each of the fractions is the multiplicative inverse of the other.



Here, $\frac{5}{9}$ is the multiplicative inverse of $\frac{9}{5}$ and

$\frac{9}{5}$ is the multiplicative inverse of $\frac{5}{9}$.

What is the multiplicative inverse of $\frac{3}{2}$? ______

Multiplicative inverse of a mixed number

Consider a mixed number such as $1\frac{1}{2}$.

Converting it to an improper fraction we have,

$1\frac{1}{2} = \frac{3}{2}$ Since $\frac{3}{2} \times \frac{2}{3} = 1$, $\frac{2}{3}$ is the multiplicative inverse of $\frac{3}{2}$ or $1\frac{1}{2}$.

What are the multiplicative inverses of $3\frac{1}{5}$ and $2\frac{1}{3}$?

What is the multiplicative inverse of 1?

It is 1 because $1 \times 1 = 1$.

What is the multiplicative inverse of 0?

Multiplicative inverse of 0 does not exist because there is no number which when multiplied by 0 gives 1 as the product.

So,

> the multiplicative inverse of 1 is itself and the multiplicative inverse of 0 does not exist.



Study the following multiplicative inverse table:

Number	Multiplicative inverse	Observation
5	$\frac{1}{5}$	Number is greater than 1. Multiplicative inverse is less than 1.
$\frac{1}{3}$	3	Number is less than 1. Multiplicative inverse is greater than 1.
$1\frac{1}{2}$	$\frac{2}{3}$	Number is greater than 1. Multiplicative inverse is less than 1.
1	1	Multiplicative inverse of 1 is 1.
0	Does not exist	No multiplicative inverse for 0.

Exercise 4.9 : Find the multiplicative inverse of each.

1) $\frac{3}{7}$ 2) $\frac{7}{9}$ 3) 8 4) $\frac{1}{9}$ 5) 1

6) $2\frac{2}{5}$ 7) $3\frac{1}{3}$ 8) $4\frac{7}{9}$ 9) $3\frac{1}{4}$ 10) $2\frac{1}{2}$

• Division of a fractional number by a whole number



Maths Lab Activity 2

Let us learn division of a fractional number by a whole number using paper strips.



Take a strip of paper and divide it into 4 equal parts. Let this represent 1.



How will you represent $\frac{1}{2}$? By cutting the strip into two equal parts $1 \div 2 = \frac{1}{2}$



You can represent $\frac{1}{4}$ by cutting the strip further into two equal parts.

Therefore $\frac{1}{4}$ can be written as $\frac{1}{2} \div 2$

and can be obtained by taking $\frac{1}{2}$ of $\frac{1}{2}$

So $\frac{1}{2} \div 2 = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$

multiplicative inverse of 2

Now divide another strip into 8 equal parts.

If ▭▭▭▭▭▭▭▭ represents 1

then ▭▭▭▭ represents $\frac{1}{2}$

and ▭ represents $\frac{1}{8}$ of the whole.

This is also obtained by dividing $\frac{1}{2}$ into 4 equal parts, i.e. $\frac{1}{2} \div 4$ or by taking $\frac{1}{4}$ of $\frac{1}{2}$.

So $\frac{1}{2} \div 4 = \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

multiplicative inverse of 4

We find that,

to divide a fractional number by a non zero whole number, we multiply the fractional number by the multiplicative inverse of the whole number.



Example : Divide $\frac{4}{5}$ by 2.

$\frac{4}{5} \div 2 = \frac{4}{5} \times \frac{1}{2} = \frac{4}{10} = \frac{2}{5}$

Exercise 4.10 : Solve

1) $\frac{3}{7} \div 3$	2) $\frac{4}{9} \div 5$	3) $\frac{1}{3} \div 4$	4) $\frac{2}{5} \div 7$
5) $\frac{3}{4} \div 6$	6) $\frac{2}{3} \div 3$	7) $\frac{2}{9} \div 4$	8) $\frac{6}{7} \div 5$
9) $\frac{5}{6} \div 4$	10) $\frac{1}{3} \div 5$	11) $\frac{2}{7} \div 5$	12) $\frac{5}{9} \div 4$

- **Division of a whole number by a fractional number**

Consider $1 \div \frac{1}{4}$

If ▢▢▢▢ represents 1

then ▢ represents $\frac{1}{4}$

We see that there are 4 pieces of $\frac{1}{4}$ in 1.

So $1 \div \frac{1}{4} = 4$

Consider another division: $2 \div \frac{1}{3}$

If ▢▢▢ represents 1

then ▢▢▢▢▢▢ represents 2

and ▢ represents $\frac{1}{3}$.

We see that there are 6 pieces of $\frac{1}{3}$ in 2.

So $2 \div \frac{1}{3} = 6$

Now study the following.

$1 \div \frac{1}{4} = 4$; also $1 \times \frac{4}{1} = 4$ where $\frac{4}{1}$ is the multiplicative inverse of $\frac{1}{4}$.

$2 \div \frac{1}{3} = 6$; also $2 \times \frac{3}{1} = 6$ where $\frac{3}{1}$ is the multiplicative inverse of $\frac{1}{3}$.

So,

to divide a whole number by a fractional number we multiply the whole number by the multiplicative inverse of the fractional number.



Example : Divide 9 by $\frac{3}{4}$.

$$9 \div \frac{3}{4} = 9 \times \frac{4}{3} = \frac{36}{3} = 12$$

multiplicative inverse of $\frac{3}{4}$



Maths Lab Activity 3

Take a 2m long piece of string. Cut it into $\frac{1}{4}$ m pieces. How many pieces do you get?

Now work out the sum $2 \div \frac{1}{4}$. Does your answer tally with the number of pieces you got?

Exercise 4.11 : Solve

1) $7 \div \frac{5}{6}$	2) $14 \div \frac{1}{3}$	3) $15 \div \frac{1}{2}$	4) $5 \div \frac{1}{6}$
5) $4 \div \frac{2}{3}$	6) $8 \div \frac{1}{5}$	7) $9 \div \frac{2}{3}$	8) $8 \div \frac{3}{4}$
9) $10 \div \frac{5}{7}$	10) $10 \div \frac{1}{4}$	11) $17 \div \frac{1}{4}$	12) $6 \div \frac{2}{5}$

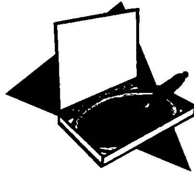
• Division of a fractional number by a fractional number

Example 1 : $\frac{3}{5} \div \frac{1}{5}$

If ☐☐☐☐☐ represents 1

then ☐ represents $\frac{1}{5}$

and ☐☐☐ represents $\frac{3}{5}$.



We find that there are 3 pieces of $\frac{1}{5}$ in $\frac{3}{5}$.

So $\frac{3}{5} \div \frac{1}{5} = 3$

Example 2 : $2\frac{1}{2} \div \frac{1}{2}$

If [two boxes] represents 1

then [one box] represents $\frac{1}{2}$

and [five boxes] represents $2\frac{1}{2}$.

We find that there are 5 pieces of $\frac{1}{2}$ in $2\frac{1}{2}$.

So $2\frac{1}{2} \div \frac{1}{2} = 5$

Now study the following.

$\frac{3}{5} \div \frac{1}{5} = 3$; also $\frac{3}{5} \times \frac{5}{1} = 3$; $\frac{5}{1}$ is the multiplicative inverse of $\frac{1}{5}$.

$2\frac{1}{2} \div \frac{1}{2} = 5$; also $\frac{5}{2} \times \frac{2}{1} = 5$; $\frac{2}{1}$ is the multiplicative inverse of $\frac{1}{2}$.

Therefore,

to divide a fractional number by another fractional number, we multiply the fractional number (dividend) by the multiplicative inverse of the other fractional number (divisor).



Example : $\frac{4}{5} \div \frac{1}{10}$: $\frac{4}{5} \div \frac{1}{10} = \frac{4}{5} \times \frac{10}{1} = \frac{40}{5} = 8$

multiplicative inverse of $\frac{1}{10}$

Exercise 4.12 : Solve

1) $\frac{3}{8} \div \frac{3}{4}$	2) $\frac{15}{16} \div \frac{3}{4}$	3) $\frac{21}{28} \div \frac{3}{7}$	4) $\frac{10}{11} \div \frac{1}{11}$
5) $\frac{6}{7} \div \frac{3}{7}$	6) $\frac{12}{7} \div \frac{3}{7}$	7) $4\frac{1}{2} \div \frac{1}{4}$	8) $3\frac{1}{5} \div \frac{1}{5}$
9) $4\frac{1}{3} \div \frac{13}{5}$	10) $4\frac{1}{4} \div \frac{1}{8}$	11) $5\frac{1}{3} \div \frac{8}{9}$	12) $2\frac{4}{5} \div \frac{7}{0}$

• Properties of division of fractional numbers

Study the following examples

1) $\frac{2}{5} \div 1 = \frac{2}{5} \times 1 = \frac{2}{5}$

2) $2\frac{1}{4} \div 1 = \frac{9}{4} \times 1 = \frac{9}{4}$

What do you observe here?

When a fractional number is divided by 1, the quotient is the fractional number itself.



Consider the following divisions.

1) $0 \div \frac{1}{2} = 0 \times \frac{2}{1} = 0$

2) $0 \div 4\frac{1}{2} = 0 \div \frac{9}{2} = 0 \times \frac{2}{9} = 0$

From the above divisions it is clear that,



when 0 is divided by a non-zero fractional number, the quotient is always zero.

Remember that division by 0 is not defined. So we cannot divide a fractional number by zero.

Also, study the following examples.

1) $\frac{3}{4} \div \frac{3}{4} = \frac{3}{4} \times \frac{4}{3} = 1$

2) $4\frac{1}{2} \div 4\frac{1}{2} = \frac{9}{2} \div \frac{9}{2} = \frac{9}{2} \times \frac{2}{9} = 1$

When a non-zero fractional number is divided by itself, the quotient is 1.



Exercise 4.13 : Using properties of division, fill in the following blanks.

1) $\frac{3}{5} \div \frac{3}{5} =$ ____

2) $4\frac{1}{4} \div 4\frac{1}{4} =$ ____

3) $\frac{4}{5} \div$ ____ $= 1$

4) $\frac{6}{7} \div 1 =$ ____

5) $0 \div \frac{3}{7} =$ ____

6) $0 \div \frac{4}{5} =$ ____

7) ____ $\div 2\frac{1}{2} = 0$

8) $\frac{4}{5} \div$ ____ $= 1$

• Word problems

Example 1: The cost of $3\frac{1}{2}$ kg of sweets is ₹ $185\frac{1}{2}$. Find the cost of 1 kg of sweets.

Cost of $3\frac{1}{2}$ kg of sweets = ₹ $185\frac{1}{2}$

∴ Cost of 1 kg of sweets = ₹ $185\frac{1}{2} \div 3\frac{1}{2}$

$= \frac{371}{2} \div \frac{7}{2} =$ ₹ $\frac{\overset{53}{371}}{\underset{1}{2}} \times \frac{\overset{1}{2}}{\underset{1}{7}} =$ ₹ 53

Example 2: In a class there are 32 girls. If the fraction of girls in the class is $\frac{8}{11}$, find the total number of students in the class.

$\frac{8}{11}$ of the students = 32 i.e. $\frac{8}{11}$ × number of students = 32

$\therefore$ Number of students = $32 \div \frac{8}{11} = \overset{4}{\cancel{32}} \times \frac{11}{\underset{1}{\cancel{8}}} = 44$

Exercise 4.14

1) The cost of $4\frac{1}{2}$ kg of sweets is ₹ $24\frac{3}{4}$. What is the cost of 1 kg of sweets?

2) A man walks $5\frac{5}{8}$ km in $1\frac{1}{2}$ hours. What distance does he cover in 1 hour?

3) 8 tins holds $42\frac{2}{3}$ l of oil. How many litres can 1 such tin hold?

4) The product of two numbers is 4. One of the numbers is $5\frac{1}{3}$. Find the other.

5) If $5\frac{2}{3}$ kg of sweets are distributed among 17 children, what quantity of sweets does each child get?

6) If a bus travels 104 km in $3\frac{1}{4}$ hours, how far does it go in 1 hour?

7) Banu cuts a 12 m cloth into $\frac{3}{4}$ m pieces each. How many pieces does she get?

8) Seema buys $2\frac{1}{2}$ kg of sweets and out of that makes packets weighing $\frac{1}{4}$ kg each. How many packets does she make?

9) $2\frac{1}{2} \times \frac{4}{5} = 2$. Write the two division facts corresponding to this multiplication fact.

10) The product of two numbers is $3\frac{1}{2}$. One of them is 7. Find the other.



WORKSHEET

for formative assessment



MCQs

1. If A + 1 $\frac{3}{4}$ = 2, A must be equal to

   a) 1 b) $\frac{3}{4}$ c) $\frac{1}{2}$ d) $\frac{1}{4}$

2. Which two fractions are equivalent?

   a) $\frac{5}{2}$ and $\frac{2}{5}$ b) $\frac{4}{3}$ and $\frac{8}{6}$ c) $\frac{1}{4}$ and $\frac{2}{4}$ d) $\frac{2}{3}$ and $\frac{1}{3}$

3. $\frac{5}{2} \div \frac{3}{4} =$

   a) $\frac{10}{3}$ b) $\frac{10}{8}$ c) $\frac{13}{4}$ d) 1

4. $\frac{2}{5} \times \frac{3}{7} =$

   a) $\frac{14}{15}$ b) $\frac{6}{35}$ c) $\frac{35}{6}$ d) $\frac{15}{14}$

5. The multiplication inverse of 1 is

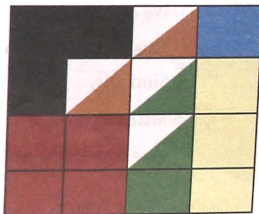
   a) zero b) one c) cannot be found d) less than 1

Hots questions

1) A 100 m cloth is cut into 1 $\frac{1}{2}$ m pieces. How many pieces are cut? What is left over?
2) A piece of cake is cut into 8 equal parts. Ramu eats $\frac{1}{4}$ of the cake and Shyam gives $\frac{3}{8}$ of the cake to his sister. One piece is spoilt and cannot be given away. How many good pieces of cake are left?
3) Ashita can walk 4 $\frac{4}{5}$ km in one hour. What distance can she walk in 10 minutes?

   (*Hint* : 10 minutes = $\frac{10}{60} = \frac{1}{6}$ of an hour)

Fun activity



What fraction of the large square is red?

What fraction of the large square is blue?

What fraction of the large square is orange?

What fraction of the large square is green?

What fraction of the large square is black?

What fraction of the large square is yellow?

What fractions of the large square has no colour?

Play fraction games online at http://www.shepardsoftware.com/math.htm#fraction

Decimals

5

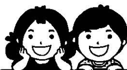
Learning Objectives



You will be able to:

- convert fractions with 10, 100 and 1000 as denominators into decimal numbers.
- write expanded form of decimals and compare decimals to say which is bigger.
- add and subtract like and unlike decimals.
- multiply and divide decimal numbers by a whole or a decimal number.
- round off decimals to nearest tenth and hundredth.

Warm Up





Math Lab Activity 1

Take a strip. Divide it into ten equal parts. Shade one part.



You know that the shaded part is written as $\frac{1}{10}$ and read as ' one-tenth'.

We can also write one-tenth as '**.1**'

This is read as '**point 1**'.

Similarly,

Shade 2 parts.



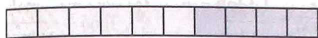
$\frac{2}{10}$ = two-tenths written as **.2**

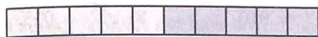
Shade 3 parts.



$\frac{3}{10}$ = three-tenths written as **.3**

Fill in the blanks :

 = _____ = _____

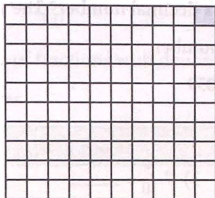
 = _____ = _____

 = _____ = _____

Ten $\frac{1}{10}$ s together make 1.
Ten .1s also make 1

.1, .2, .3 etc are called **decimals** or **decimal fractions.**

Make a grid of 10 × 10.
Shade one part.

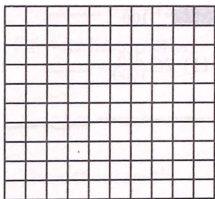


You know that the shaded part is written as $\frac{1}{100}$ and read as 'one-hundredth'.

We can also write one-hundredth as '**.01**'

This is read as '**point zero 1**'.

Shade 2 parts.



$\frac{2}{100}$ = 'two-hundredths' written as '.02'

read as '**point zero 2**'.

Hundred $\frac{1}{100}$ s together make 1; hundred .01s make 1

Similarly

1) $\frac{3}{100} = .03$ 2) $\frac{4}{100} = .04$ 3) $\frac{5}{100} =$ _____ 4) $\frac{6}{100} =$ _____ 5) $\frac{8}{100} =$ _____

6) $\frac{10}{100} = .10$ 7) $\frac{11}{100} = .11$ 8) $\frac{15}{100} =$ _____ 9) $\frac{26}{100} =$ _____ 10) $\frac{99}{100} =$ _____

One part of 1000 equal parts is one-thousandth part of the whole.

One-thousandth = $\frac{1}{1000}$ = .001

Two-thousandths = $\frac{2}{1000}$ = .002

Thousand $\frac{1}{1000}$ s together make 1
Thousand .001s make 1

Fill in the blanks

1) $\frac{3}{1000}$ = ______ 2) $\frac{4}{1000}$ = ______ 3) $\frac{5}{1000}$ = ______ 4) $\frac{6}{1000}$ = ______

5) $\frac{7}{1000}$ = ______ 6) $\frac{8}{1000}$ = ______ 7) $\frac{10}{1000}$ = .010 8) $\frac{15}{1000}$ = .015

9) $\frac{38}{1000}$ = ______ 10) $\frac{89}{1000}$ = ______ 11) $\frac{100}{1000}$ = .100 12) $\frac{128}{1000}$ = .128

13) $\frac{545}{1000}$ = ______ 14) $\frac{998}{1000}$ = ______

Mixed fractions as decimals

How will you write the mixed fraction $3\frac{3}{10}$ as a decimal number? The whole number is written as it is, and $\frac{3}{10}$ is written as a decimal number.

$3\frac{3}{10}$ = 3.3; Similarly $5\frac{16}{100}$ = 5.16, $12\frac{59}{1000}$ = 12.059

Fill in the blanks.

1) $5\frac{9}{10}$ = ______ 2) $10\frac{5}{10}$ = ______ 3) $7\frac{7}{10}$ = ______ 4) $29\frac{6}{10}$ = ______

5) $6\frac{9}{100}$ = 6.09 6) $8\frac{19}{100}$ = ______ 7) $21\frac{5}{100}$ = ______ 8) $36\frac{89}{100}$ = ______

9) $7\frac{8}{1000}$ = 7.008 10) $15\frac{19}{1000}$ = ______ 11) $26\frac{215}{1000}$ = ______ 12) $88\frac{999}{1000}$ = ______

• Place-value chart

The place-value chart can be extended to tenths, hundredths and thousandths.

Fill in the following table.

	Hundreds H	Tens T	Ones O	tenths t	hundredths h	thousandths th
425.126	4	2	5	1	2	6
4.321						
32.001						

425.126 is read as 'four hundred twenty-five point one two six' and not as 'four hundred twenty five point one hundred twenty-six'.

Decimal fractions have two parts—**a whole number part** and **a decimal number part**. These are separated by a dot (.). Whole number part is to the left of the dot and decimal part is to the right of the dot.

If a number does not have a whole number part, a zero is put for the whole number.

Example 1 : .004 = 0.004

.38 = 0.38

Similarly if there is no decimal part, a zero is put for it.

Example 2 : 48 = 48.0

3 = 3.0

Following is the table of fractions with denominators 100 and 1000.

Fill in the blank spaces.

Fractions	Read as	Decimals	Read as
$\frac{2}{100}$	Two hundredths	0.02	Zero point zero two
$\frac{56}{100}$	Fifty-six hundredths	0.56	______
$2\frac{27}{100}$	______	______	Two point two seven
$\frac{3}{1000}$	Three thousandths	0.003	Zero point zero zero three
$\frac{34}{1000}$	______	______	______
$\frac{1142}{1000} = 1\frac{142}{1000}$	One and one hundred forty-two thousandths.	______	______

Exercise 5.1

A. Read and write the number names. The first one has been done for you.

1) 12.03 Twelve and three hundredths or Twelve point zero three.

2) 16.08 3) 17.005 4) 6.889 5) 3.531

6) 28.317 7) 10.07 8) 6.91 9) 7.56

B. Write as fractions or mixed numerals.

1) $1.12 = 1\frac{12}{100}$ | 2) 3.3 | 3) 15.9 | 4) 0.15

5) 0.008 | 6) 4.09 | 7) 0.885 | 8) 15.36

C. Write as decimals.

1) $\frac{229}{100} = 2.29$ | 2) $\frac{13}{10}$ | 3) $\frac{74}{10}$ | 4) $\frac{101}{10}$

5) $\frac{545}{100}$ | 6) $\frac{5889}{1000}$ | 7) $\frac{1009}{1000}$ | 8) $\frac{5042}{1000}$

• Expanded form of decimals

Consider 4197.5. The place value of 5 is 5 tenths or $\frac{5}{10}$

Consider 4197.53. The place value of 3 is 3 hundredths or $\frac{3}{100}$

Consider 4197.538. The place value of 8 is 8 thousandths or $\frac{8}{1000}$

So we can write 4197.538 in the expanded form as

4 thousands + 1 hundred + 9 tens + 7 ones + 5 tenths + 3 hundredths + 8 thousandths

or $4197.538 = 4000 + 100 + 90 + 7 + \frac{5}{10} + \frac{3}{100} + \frac{8}{1000}$

4197.538 is read as 'four thousand one hundred ninety seven point five, three, eight'.



CD activity 2
Kerry Waker

Read the following numbers.

Thousands	Hundreds	Tens	Ones	tenths	hundredths	thousandths
	3	4	8	9	2	
		3	5	0	6	8
4	9	2	1	8	7	5

These are read as:

1) Three hundred forty-eight point nine two.
2) Thirty-five point zero six eight.
3) Four thousand, nine hundred twenty-one point eight seven five.

In the expanded form :



348.92 $= 300 + 40 + 8 + \frac{9}{10} + \frac{2}{100}$

35.068 $= 30 + 5 + \frac{0}{10} + \frac{6}{100} + \frac{8}{1000} = 30 + 5 + \frac{6}{100} + \frac{8}{1000}$

4921.875 $= 4000 + 900 + 20 + 1 + \frac{8}{10} + \frac{7}{100} + \frac{5}{1000}$

Exercise 5.2

A. Write in the expanded form.

1) 76.32
2) 182.7
3) 48.372
4) 92.007
5) 526.906
6) 10.001

B. Write the decimal number for the following.

1) $4 + \frac{6}{10}$
2) $7 + \frac{5}{10} + \frac{6}{100}$
3) $16 + \frac{2}{10} + \frac{5}{1000}$
4) $7 + \frac{1}{10} + \frac{3}{1000}$
5) $25 + \frac{3}{100} + \frac{6}{1000}$
6) $5 + 0.3 + 0.05$
7) $10 + 6 + 0.1 + 0.02$
8) $90+9+0.9+0.09+0.009$
9) $80 + 0.5 + 0.006$
10) $0.5 + 0.003$

• Converting decimals into fractions

Study and complete the following table.

Decimal	Expanded form	Fractional form	Numerator of fraction	Number of zeros in the denominator of the fraction
.8	$8 \times \frac{1}{10}$	$\frac{8}{10}$	8	1
.52	$5 \times \frac{1}{10} + 2 \times \frac{1}{100}$	$\frac{52}{100}$	52	2
.324				
4.6	$4 + 6 \times \frac{1}{10}$	$\frac{46}{10}$	46	1
52.31				

1. In each case, the digits of the numerator of the fraction are the same as the digits of the given decimal, without the decimal point.
2. The number of zeros in the denominator of the fraction is the same as the number of decimal places in the given decimal.

Thus to convert a decimal into a fraction, we

(i) write the decimal without the decimal point as the numerator of the fraction.
(ii) write the denominator as 1 followed by as many zeros as there are decimal places in the given decimal.
(iii) simplify the fraction if possible.



Example : Convert 0.25 and 1.625 into fractions.

$$0.25 = \frac{25}{100} = \frac{1}{4}$$

$$1.625 = \frac{1625}{1000} = \frac{1625 \div 25}{1000 \div 25} = \frac{65}{40} = \frac{65 \div 5}{40 \div 5} = \frac{13}{8} = 1\frac{5}{8}$$

Exercise 5.3: Convert the following decimals into fractions.

1) 3.2	2) 1.90	3) 2.04	4) 6.25	5) 0.23
6) 0.35	7) 9.005	8) 0.125	9) 84.92	10) 11.111

• Like and unlike decimals

You know that fractions having the same denominators are called like fractions, for example $\frac{2}{10}$, $\frac{5}{10}$, $\frac{15}{10}$ and $\frac{105}{100}$.

Fractions having different denominators are called unlike fractions, like $\frac{2}{10}$, $\frac{1}{5}$ and $\frac{20}{100}$.

Just as we have like and unlike fractions, we also have like and unlike decimals.

Consider the following groups of decimals.

Group I	: 0.7, 0.8, 1.1, 25.6	all of them have one decimal place
Group II	: 0.21, 6.56, 200.48, 18.18	all of them have two decimal places
Group III	: 0.321, 1.569, 29.359, 9.415	all of them have three decimal places

Decimals having the same number of decimal places are called like decimals.

Thus all decimals in Group I are like decimals. So are the decimals in Groups II and III.

Decimals having different number of decimal places are unlike decimals.

Converting unlike decimals to like decimals

Example 1 : Consider 6.5 and 0.26. They are unlike decimals.

We can convert 6.5 into a decimal having two decimal places without changing its value, by putting a 0 in the hundredths place, i.e. 6.5 = 6.50

6.50 and 0.26 are like decimals.

Example 2 : Convert 2.5, 8.03, 7.352 into like decimals.

As 2.5 has one decimal place, 8.03 has two decimal places and 7.352 has three decimal places. We can convert them into equivalent decimals with three decimal places.

2.5 = 2.500, 8.03 = 8.030

2.500, 8.030 and 7.352 are like decimals.

Exercise 5.4

A. Which of the following are like decimals?

1) 7.01, 18.34
2) 16.325, 0.165
3) 6.56, 56.6
4) 30.3, 3.03
5) 100.1, 100.01

B. Which of the following are unlike decimals?

1) 15.31, 1.36
2) 2.03, 6.185
3) 42.7, 7.42
4) 16.003, 5.301
5) 101.1, 101.11

C. Change into like decimals.

1) 56.8, 7.11
2) 0.802, 54.32
3) 4.78, 9.193, 10.3
4) 36.19, 361.9, 3.619
5) 3.8, 81.92, 43.324
6) 49.62, 2.8, 1.493

• Ordering of decimals

Decimals can be compared in the same way as whole numbers.

1. First compare the whole number portion. The decimal with the bigger whole number is greater.
2. If the whole number portion is the same, compare the digit in the tenth place. The decimal with the bigger digit in the tenths place is greater.
3. If the digit in the tenth place is the same, compare the digit in the hundredths place, and so on.



Example 1: Compare 58.111 and 12.999

Compare the whole numbers.

Since 58 > 12, therefore 58.111 > 12.999

Example 2: Compare 16.323 and 16.456

The whole numbers are the same : 16 = 16

Compare the digit in the tenths place.

Since 4 tenths > 3 tenths, therefore 16.456 > 16.323

Example 3: Compare 30.46 and 30.469

The whole number portion, and the digits in the tenths and hundredths place are the same.

Compare the digits in the thousandths place.

The digit in the thousandths place of 30.46 is 0 since 30.46 = 30.460

Since 9 thousandths > 0 thousandths, therefore 30.469 > 30.46

Exercise 5.5

A. Fill in the blanks with >, < or =

1) 0.39 ___ 0.93	2) 9.78 ___ 9.48	3) 11.32 ___ 11.3
4) 32.46 ___ 32.06	5) 0.434 ___ 0.435	6) 2.222 ___ 2.231
7) 8.867 ___ 8.678	8) 90.456 ___ 90.656	9) 42.489 ___ 41.984
10) 58.23 ___ 58.230	11) 99.009 ___ 99.09	12) 68.006 ___ 68.6

B. Arrange in ascending order.

1) 0.72, 0.68, 0.504, 1.02	2) 3.32, 3.478, 3.039, 1.09, 0.092
3) 7.99, 9.79, 0.979, 1.32, 10.00	4) 0.932, 2.93, 0.342, 0.839, 9.38
5) 7.234, 7.326, 7.32, 5.439	6) 0.002, 0.02, 0.2, 2.0

C. Arrange in descending order.

1) 11.201, 1.201, 12.01, 2.11	2) 48.34, 8.34, 84.43, 0.844
3) 30.08, 8.03, 300.8, 8.003	4) 58.7, 8.75, 7.85, 50.78
5) 3.003, 3.03, 3.3, 0.03	6) 21.111, 21.121, 21.212, 22.111

• Addition of decimals

Addition of decimals is similar to addition of whole numbers.

1. Write the addends one below the other so that the decimal points of all the addends are in the same column.
2. The digits having the same place values should be in the same column.
3. Add as in the case of whole numbers.
4. In the sum, put the decimal point directly below the decimal points in the addends.



Example 1: Add 4.97 and 5.38

```
    4.97
+   5.38
--------
   10.35
```

Answer : 10.35

Example 2: Add 3.456, 5.386 and 13.308

```
    3.456
+   5.386
+  13.308
---------
   22.150
```

Answer : 22.15

Example 3: Add 16.3 and 5.84

16.3 and 5.84 are unlike decimals.

Convert them into like decimals and add.

```
16.3  →     16.30
5.84  →  +   5.84
         --------
            22.14
```

Answer : 22.14

Example 4: Add 43.08, 5.932, 187.6

Convert the decimals into like decimals with 3 decimal places, and add.

```
43.08  →     43.080
5.932  →  +   5.932
187.6  →  + 187.600
          ---------
            236.612
```

Answer : 236.612

Exercise 5.6

A. Add

1) 3.5, 5.6
2) 6.66, 5.34
3) 17.46, 19.59
4) 0.345, 0.794
5) 18.456, 28.389
6) 9.999, 1.111
7) 5.606, 6.505, 7.404
8) 5.634, 6.828, 23.969
9) 3.343, 4.585, 12.686

B. Add

1) 48.37, 94.03, 4.392, 459.87
2) 181.98, 345.75, 64.78, 9.72
3) 793.03, 98.78, 8.031, 48.32, 0.039
4) 454.98, 3.035, 17.28, 1.8, 0.05
5) 72.79, 527.28, 64.03, 4.6, 0.006
6) 5.38, 53.8, 538, 0.538
7) 463.23, 55.555, 444.5, 6.453
8) 52.005, 6.006, 23.05, 50.5
9) 48.632, 53.576, 48.336, 42.558
10) 20.002, 22.222, 20.202, 2.222

• Subtraction of decimals

Like addition, subtraction of decimals is similar to subtraction of whole numbers.

1. Write the smaller number below the greater number with the decimal point in the same column.
2. Write the decimals so that the digits having the same place values are in the same column.
3. Subtract as in the case of whole numbers.
4. Put the decimal point in the answer directly below the decimal point of the given decimals.



Example 1 : Subtract 13.65 from 24.74

$$\begin{array}{r} 24.74 \\ -\ 13.65 \\ \hline 11.09 \\ \hline \end{array}$$

Answer : 11.09

Example 2 : Subtract 26.436 from 29.394

$$\begin{array}{r} 29.394 \\ -\ 26.436 \\ \hline 2.958 \\ \hline \end{array}$$

Answer : 2.958

Example 3 : Subtract 38.136 from 66.32.

Convert 38.136 and 66.32 to like decimals with three decimal places, and subtract.

66.32 ⟶ 66.320

– 38.136 ⟶ – 38.136

$$\begin{array}{r} 66.320 \\ -\ 38.136 \\ \hline 28.184 \\ \hline \end{array}$$

Answer : 28.184

Example 4 : Subtract 38.3 from 39.003

39.003 ⟶ 39.003

– 38.3 ⟶ – 38.300

$$\begin{array}{r} 39.003 \\ -\ 38.300 \\ \hline 0.703 \\ \hline \end{array}$$

Answer : 0.703

Exercise 5.7

A. Subtract

1) 39.5 – 32.6	2) 22.5 – 18.6	3) 19.3 – 18.4
4) 5.8 – 4.3	5) 4.23 – 2.32	6) 14.04 – 9.64
7) 83.43 – 28.62	8) 13.64 – 10.46	9) 6.426 – 5.389
10) 18.684 – 7.539	11) 426.326 – 284.482	12) 38.565 – 8.686

B. Subtract

1) 51.03 – 9.984	2) 48.32 – 9.875	3) 3 – 2.982
4) 5 – 3.009	5) 1 – 0.098	6) 20 – 19.937
7) 15.3 – 9.872	8) 0.32 – 0.135	9) 0.03 – 0.002
10) 4 – 0.328	11) 0.01 – 0.001	12) 42 – 39.09

• Use of decimals – Applications

Decimals are used in expressing money, distance and length, weight and capacity.

Money

We know that 100 paise make a rupee.

$\therefore$ 1 p = $\frac{1}{100}$ rupee = 0.01 rupee = ₹ 0.01

5 p = $\frac{5}{100}$ rupee = 0.05 rupee = ₹ 0.05

10 p = $\frac{10}{100}$ rupee = 0.10 rupee = ₹ 0.10

Thus 5 rupees 25 paise is written as ₹ 5.25 and read as 'Rupees five point two five' or 'Rupees five and paise twenty-five'.

Similarly Rupees six and paise thirty is written as ₹ 6.30.

Length

We know that 100 centimetres = 1 metre

Therefore 1 cm = $\frac{1}{100}$ m = 0.01 m

5 cm = $\frac{5}{100}$ m = 0.05 m

10 cm = $\frac{10}{100}$ m = 0.1 m

We express 8 m 16 cm as 8.16 m

and 9 m 5 cm as 9.05 m

Also as 1000 metres = 1 kilometre

1 m = $\frac{1}{1000}$ km = 0.001 km

Similarly 10 m = $\frac{\square}{1000}$ km = 0.01 km

Thus 8 km 675 m is expressed as 8.675 km

5 km 56 m is expressed as 5.056 km

Weight and capacity

We know that 1000 grams = 1 kilogram

Therefore 1 g = $\frac{1}{1000}$ kg = 0.001 kg

9 g = $\frac{\square}{1000}$ kg = 0.009 kg

Similarly 11 g = $\frac{\square}{1000}$ kg = ________ kg

Thus 22 kg 555 g is written as 22.555 kg

10 kg 15 g is written as ________ kg

we also know that 1000 millilitre = 1 litre

Therefore $1\ m\ell = \frac{1}{1000}\ \ell = 0.001\ \ell$

So $10\ m\ell = \frac{10}{1000}\ \ell =$ ______ ℓ

Similarly $15\ m\ell = \frac{15}{1000}\ \ell =$ ______ ℓ

Thus 10 ℓ 111 mℓ is written as ______ ℓ

5 ℓ 5 mℓ is written as ______ ℓ

Exercise 5.8

A. Write in decimals in the units written in brackets.

1) 80 rupees 7 paise (₹)
2) 6 rupees 40 paise (₹)
3) 10 rupees 10 paise (₹)
4) 78 m 48 cm (m)
5) 1 m 1 cm (m)
6) 0 m 15 cm (m)
7) 1 kg 10 g (kg)
8) 200 g (kg)
9) 11 kg 965 g (kg)
10) 100 kg 1 g (kg)
11) 50 ℓ 500 mℓ (ℓ)
12) 250 mℓ (ℓ)

B. State 'True' or 'False'.

1) 10.01 ℓ = 10.1 ℓ
2) 6.505 g = 6.55 g
3) 8.800 g = 8.8 g
4) 10.00 kg = 10.1 kg
5) 0.04 m = 0.4 m
6) 9.90 kg = 9.9 kg

C. Convert into decimals and add.

1) 88 rupees 16 paise, 66 rupees 15 paise
2) 80 m 15 cm, 64 m 32 cm
3) 15 km 635 m, 16 km 344 m
4) 55 kg 100 g, 66 kg 350 g
5) 60 ℓ 450 mℓ, 36 ℓ 340 mℓ

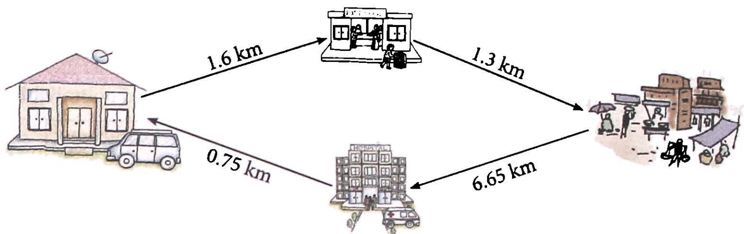
D. Convert into decimals and subtract.

1) 33 rupees 99 paise from 66 rupees 1 paise
2) 101 m 50 cm from 102 m 5 cm
3) 6 km 10 m from 16 km 100 m
4) 15 kg 656 g from 15 kg 744 g
5) 1 ℓ 11 mℓ, from 2 ℓ 10 mℓ

E. Word problems in addition and subtraction

1) Ram purchased a book for ₹ 18.45, a pair of shoes for ₹ 70.25 and a shirt for ₹ 55.75. How much money did Ram spend in all?

2) Balu cycled from his house to the post office, to the bazaar, then to the doctor and then he returned home. The distances are marked in the figure below. What is the total distance covered by Balu?



3) A container holds 50.6 litres of water. If 19.7 litres of water is used up, how much water is left in the container?

4) A shopkeeper had ₹ 50.48 in his cash box when the sales began. At the end of the day he had ₹ 200.60. How much did he sell that day?

5) What should be subtracted from 45.13 to get 30.56?

6) What should be added to 0.329 to get 4.000?

7) My mother bought 13.25 kg of sugar and my father bought 8.75 kg of sugar. How much sugar did they buy altogether?

8) Gopal had ₹ 58.90 in his purse and Ram had ₹ 49.98. How much more money did Gopal have than Ram?

9) My car can hold 55.4 litres of petrol. I filled it with 48.9 litres. How much more petrol can it hold?

10) Study the table of distances and answer the questions.

To \ From	A	B	C
P	40.18 km	24.5 km	6.8 km
Q	52.32 km	19.7 km	11.8 km
R	7.9 km	10.12 km	5.6 km

Which of the distances is greater and by how much?

(i) A to P or B to Q
(ii) A to R or B to P
(iii) B to Q or C to R
(iv) A to R or B to Q
(v) C to R or A to R

• Multiplication of decimals

You have already learnt addition and subtraction of decimals. Now let us study the process of multiplication of decimals.

Study the following:

1) $2 + 2 + 2 = 3 \times 2 = 6$

2) 2 tens + 2 tens + 2 tens = 3 × 2 tens = 6 tens

3) $0.2 + 0.2 + 0.2 = 3 \times 0.2$

Since $0.2 + 0.2 + 0.2 = 0.6$

Therefore $3 \times 0.2 = 0.6$

Add here
0.2
0.2
0.2
0.6

4) $0.8 + 0.8 + 0.8 + 0.8 = 4 \times 0.8$

Since $0.8 + 0.8 + 0.8 + 0.8 = 3.2$

Therefore $4 \times 0.8 = 3.2$

Add here
0.8
0.8
0.8
0.8
3.2

5) $0.08 + 0.08 + 0.08 + = 3 \times 0.08$

Therefore $3 \times 0.08 = 0.24$

Add here
0.08
0.08
0.08
0.24

6) $0.09 + 0.09 + 0.09 + 0.09 = 4 \times 0.09$

$4 \times 0.09 = 0.36$

Add here
0.09
0.09
0.09
0.09
0.36

Let us examine these results.

$3 \times 0.2 = 0.6$ $\quad$ $4 \times 0.8 = 3.2$

$3 \times 0.08 = 0.24$ $\quad$ $4 \times 0.09 = 0.36$

We conclude that:

when a decimal number is multiplied by a whole number, there are as many decimal places in the product as there are in the decimal number.

Let us now multiply decimals with two-digit numbers.

Example: Multiply 4.38 by 39.

First multiply 438 by 39 ignoring the decimal point.

```
   4 3 8
 ×   3 9
 -------
   3 9 4 2
 1 3 1 4 0
 ---------
 1 7 0 8 2
```

The multiplicand has 2 decimal places.

Place the decimal point so that in the product there are 2 decimal places.

Therefore 4.38 × 39 = 170.82

Multiplication by numbers with 3 or more digits is similar.

Exercise 5.9

A. Multiply

1) 0.31 × 4	2) 0.28 × 2	3) 0.17 × 5	4) 0.08 × 6
5) 0.03 × 7	6) 0.13 × 9	7) 0.64 × 3	8) 0.28 × 2
9) 0.62 × 3	10) 0.56 × 4	11) 0.32 × 5	12) 0.12 × 6
13) 1.3 × 21	14) 2.3 × 34	15) 3.8 × 46	16) 4.9 × 54
17) 3.64 × 73	18) 2.48 × 84	19) 5.31 × 91	20) 3.12 × 17
21) 4.54 × 279	22) 2.87 × 321	23) 3.49 × 328	24) 5.67 × 111

• Multiplication of a decimal by 10, 100, 1000

Study the following table.

Find the product of	Product with decimal point removed	Number of decimal places	Product
14.8 × 10	148 × 10 = 1480	1	148.0
5.32 × 10	532 × 10 = 5320	2	53.2
4.732 × 10	4732 × 10 = 47320	3	47.32
5.3 × 100	53 × 100 = 5300	1	530.0
56.32 × 100	5632 × 100 = 563200	2	5632.0
39.134 × 100	39134 × 100 = 3913400	3	3913.4
4.38 × 1000	438 × 1000 = 438000	2	4380.0
38.132 × 1000	38132 × 1000 = 38132000	3	38132.0

Now compare the multiplicands and the products.

Notice that the digits are the same except for the decimal place.

Which side has the decimal point moved?

How many places has it moved?

10 ×	1	4.	8			=			1	4	8.	0	
10 ×		5.	3	2		=				5	3.	2	
10 ×		4.	7	3	2	=				4	7.	3	2
100 ×		5.	3			=			5	3	0.	0	
100 ×	5	6.	3	2		=		5	6	3	2.	0	
100 ×	3	9.	1	3	4	=		3	9	1	3.	4	
1000 ×		4.	3	8		=		4	3	8	0.	0	
1000 ×	3	8.	1	3	2	=	3	8	1	3	2.	0	

What do you observe?

- When a decimal number is multiplied by 10, the decimal point moves to the right by one place.
- When a decimal number is multiplied by 100, the decimal point moves to the right by two places.
- When a decimal number is multiplied by 1000, the decimal point moves to the right by three places.



• Multiplication of a decimal by a decimal

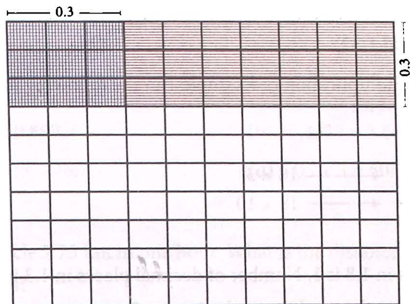


Maths Lab Activity 2

Let us find 0.3 × 0.3 or 0.3 of 0.3

- Mark 10 × 10 on a square ruled sheet and consider this as a whole.
- The horizontal lines divide the square into 10 equal parts. 3 of these make 0.3. Shade to show 0.3 of the whole with red colour pencil horizontally.
- The vertical lines divide this shaded portion into 10 equal parts. Now shade 0.3 of the already shaded portion with blue colour pencil vertically.

Does it look like the figure given below?



How many small squares are shaded with both red and blue lines?

9 (out of 100)

- Express this as a decimal : 9 out of 100 or $\frac{9}{100}$ or 0.09

Therefore, $0.3 \times 0.3 = 0.09$

Also, $0.3 \times 0.3 = 0.09 = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$

Now carry out following sums on a square ruled sheet.

1) 0.2×0.2 2) 0.5×0.3 3) 0.2×0.6 4) 0.4×0.3 5) 0.2×0.3

Example 1 : Multiply 1.8 by 1.3.



CD activity
4
Jumbo d' hut

Converting the decimals into fractions we have

$1.8 = 1\frac{8}{10} = \frac{18}{10}$ $1.3 = 1\frac{3}{10} = \frac{13}{10}$

On multiplying the two decimals we get

$1.8 \times 1.3 = \frac{18}{10} \times \frac{13}{10} = \frac{234}{100} = 2.34$

The product 2.34 has 2 decimal places which is **the sum of the number of decimal places in 1.8 and 1.3**

Example 2 : Multiply 15.8 by 1.32.

$15.8 = 15\frac{8}{10} = \frac{158}{10}$ $1.32 = 1\frac{32}{100} = \frac{132}{100}$

$\therefore 15.8 \times 1.32 = \frac{158}{10} \times \frac{132}{100} = \frac{20856}{1000} = 20.856$

Here the product 20.856 has 3 decimal places which is again the **sum of the number of decimal places in 15.8 and 1.32**

Let us now carry out the multiplication of Example 1 in the following manner.

```
   1 8
   1 3
  ----
   5 4   <------  18 × 3
 1 8 0   <------  18 × 10
  ----
 2 3 4
```

Number of decimal places in 1.8 is 1. Number of decimal places in 1.3 is 1.

Number of decimal places in the result has to be 1 + 1 = 2.

Therefore, product = 2.34

Thus to multiply two decimals we

(i) multiply the two decimals as we multiply whole numbers.

(ii) place the decimal point so as to obtain as many decimal places in the product as there are in the multiplicand and the multiplier together.

Exercise 5.10

A. Find the product :

1) 1.02 × 10	2) 13.2 × 10	3) 48.03 × 10
4) 128.3 × 10	5) 148.05 × 10	6) 148.023 × 10
7) 492.0 × 10	8) 31.37 × 10	9) 3.2 × 100
10) 3.005 × 1000	11) 31.1 × 100	12) 322.005 × 100
13) 482.2 × 100	14) 349.09 × 100	15) 3.02 × 1000
16) 6.032 × 1000	17) 9.001 × 1000	18) 78.632 × 1000
19) 128.3 × 1000	20) 492.05 × 1000	

B. Find the product :

1) 16.3 × 1.4	2) 99.01 × 2.3	3) 39.3 × 3.01
4) 56.3 × 2.1	5) 75 × 3.3	6) 38.6 × 3.2
7) 72.17 × 1.6	8) 98.01 × 2.28	9) 603.8 × 2.62
10) 27.34 × 3.19	11) 62.32 × 3.48	12) 415.39 × 3.28

C. 1) If $2.34 \times 4.89 = 11.4426$ find the value of

(a) 23.4×48.9 (b) 0.234×0.489 (c) 0.234×489

2) Fill in the blanks.

(a) $89.929 = 0.89929 \times$ ______ (b) $36.4329 = 3.64329 \times$ ______

(c) $4.67 \times 3.25 = 46.7 \times$ ______ (d) $5.05 \times 3 = 50.5 \times$ ______

D. Solve

1) Lakshmi can cycle 7.75 km in one hour. What is the distance she can cycle in 3 hours?

2) If the cost of 1 notebook is ₹ 4.35, what is the cost of 9 notebooks?

3) A train can run 38.5 km in one hour. What is the distance the train can travel in 4 hours?

4) If a tin of chocolates weighs 1.4 kg, find the weight of 14 tins of chocolates.

5) The length of a saree is 5.75 metres. Find the length of 15 such sarees.

6) If one drum can hold 4.95 litres of oil, how many litres can 6 such drums hold?

• Properties of multiplication of decimals

Recall the properties of multiplication of whole numbers.
Let us see what happens when the numbers are decimal numbers.

1. $0.25 \times 0.2 = 0.05$ $0.2 \times 0.25 = 0.05$
   $2.55 \times 0.5 = 1.275$ $0.5 \times 2.55 = 1.275$

   The product of two decimal numbers remains the same even if their order of multiplication changes.

---

2. $(0.4 \times 1.1) \times 2.1 = 0.924$
   $0.4 \times (1.1 \times 2.1) = 0.924$
   $(0.4 \times 2.1) \times 1.1 = 0.924$

   The product of more than two decimals does not change if their grouping is changed.

---

3. $0.3 \times 1 = 0.3$ $0.45 \times 1 = 0.45$
   $8.15 \times 1 = 8.15$ $25.003 \times 1 = 25.003$

   The product of a decimal and 1 is the decimal itself.

---

4. $0.2 \times 0 = 0$ $1.2 \times 0 = 0$
   $2.05 \times 0 = 0$ $3.001 \times 0 = 0$

   The product of a decimal and zero is zero.

Exercise 5.11 : Fill in the blanks.

1) $0.7 \times 0.8 =$ ______ $\times 0.7$
2) $3 \times 0.11 = 0.11 \times$ ______
3) $0.4 \times 0.2 = 0.2 \times$ ______
4) $15.69 \times 13.202 =$ ______ $\times 15.69$
5) $0.21 \times 0 =$ ______
6) $10000.01 \times 0 =$ ______
7) $19.634 \times 1 =$ ______
8) $0.001 \times 1 =$ ______
9) $99.9 \times (100.1 \times 0) =$ ______
10) $(9.89 \times 2.3) \times 8.28 =$ ______ $\times (2.3 \times 8.28)$
11) $1.2 \times (1.5 \times 1.6) = ($ ______ $\times 1.5) \times 1.6$
12) $6.38 \times ($ ______ $\times 5.6) = (5.6 \times 3.8) \times 6.38$

• Division of decimals

Division of a decimal by a whole number

Let us start with division of decimals whose whole number part is zero.

Example 1: Divide 0.8 by 2. This can be done in three ways.

1) $0.8 \div 2$
$= 8$ tenths $\div 2$
$= 4$ tenths
$= 0.4$

Thus $0.8 \div 2 = 0.4$

2) $0.8 \div 2$
$= \frac{8}{10} \times \frac{1}{2}$
$= \frac{8}{20}$
$= \frac{4}{10}$
$= 0.4$

3) $0.8 \div 2$

```
    0.4
2 ) 0.8
    0
    --
     8
     8
    --
     0
```

Example 2 : Divide 0.24 by 4 in the three ways.

1) $0.24 \div 4$
$= 24$ hundredths $\div 4$
$= 6$ hundredths
$= 0.06$

Thus $0.24 \div 4 = 0.06$

2) $0.24 \div 4$
$= \frac{24}{100} \times \frac{1}{4}$
$= \frac{24}{400}$
$= \frac{6}{100}$
$= 0.06$

3) $0.24 \div 4$

```
    0.06
4 ) 0.24
    0
    ---
     24
     24
    ---
      0
```

Exercise 5.12 : Divide

1) 0.6 by 2
2) 0.6 by 3
3) 0.25 by 5
4) 0.36 by 6
5) 0.48 by 6
6) 0.56 by 8
7) 0.72 by 8
8) 0.45 by 9
9) 0.48 by 4
10) 0.24 by 6
11) 0.77 by 7
12) 0.49 by 7

Let us now consider the decimals whose whole number part is not zero.

Example : Divide 15.6 by 3

$15.6 \div 3 = \frac{156}{10} \times \frac{1}{3} = \frac{156}{30} = 5\frac{6}{30} = 5\frac{1}{5} = 5.2$

This division can also be done in the following manner.

```
   5.2
3 |15.6|
   15
    6
    6
    0
```

Here division is done in the usual method except that after the division of the whole number is completed, the decimal point is put in the quotient and the division is continued.

Complete the following divisions.

```
   2.3
7 |16.1|
   14
    21
    21
     0
```

Answer = 2.3

```
    8
8 |65.2|
   64
```

Answer = ______

```
12 |170.4|
```

Answer = ______

Exercise 5.13 : Try to do these sums orally

1) 24.3 ÷ 3	2) 16.4 ÷ 4	3) 20.5 ÷ 5	4) 30.5 ÷ 5
5) 12.6 ÷ 6	6) 40.8 ÷ 4	7) 18.6 ÷ 6	8) 18.9 ÷ 3
9) 24.6 ÷ 6	10) 21.7 ÷ 7	11) 28.7 ÷ 7	12) 30.9 ÷ 3
13) 20.4 ÷ 4	14) 64.8 ÷ 4	15) 15.6 ÷ 3	16) 18.6 ÷ 2
17) 64.8 ÷ 8	18) 40.8 ÷ 8	19) 42.7 ÷ 7	20) 18.9 ÷ 9

Example 1 : Divide 4.518 by 9.

```
  0.502
9 |4.518|
   45
    18
    18
     0
```

Answer = 0.502

The whole number part of the dividend, that is 4, is less than the divisor 9. Therefore, 4 cannot be divided by 9. So put a 0 in the units place in the quotient. Put the decimal point to the right of the zero in the ones place to show that the division of the whole number part is complete. The rest of the division is done as usual.

Example 2 : 0.492 ÷ 12

```
      0.041
  12 |0.492|
       48
       ----
        12
        12
       ----
         0
       ----
```

Answer = 0.041

The whole number part of the dividend is 0. Therefore in the quotient also we put 0 in the units place. Divide the decimal part by 12. 12 does not divide 4. So we put another 0 in the tenths place. Now consider 49. 12 divides 49 four times. The rest of the division is done as usual.

If the last remainder in a division is not a zero then how do we complete the divisions? Let us study the following example to understand this.

Example 3 : Divide 2.13 by 15.

```
      0.142
  15 |2.130   <------- Add a zero here.
      0
      ---
      21
      15
      ---
       63
       60    <------- 
      ---
        30
        30
       ---
         0
       ---
```

Add a zero here.

The last remainder is not zero. So insert as many zeros as are needed on the right of the dividend to make the last remainder zero.

Complete the following divisions.

```
      0 . 5 _ _                 0 . 3 _ _
  12 |6 . 5 4 _            16 |5 . 5 2 _
      6 0                      0
      -----                    -----
                               5 5
      -----                    4 8
                               -----

          -----                   -----
              0                       0
          -----                   -----
```

Exercise 5.14 :

A. Divide

1) 4.05 ÷ 9	2) 1.36 ÷ 4	3) 0.84 ÷ 3	4) 3.85 ÷ 5
5) 0.123 ÷ 3	6) 0.448 ÷ 8	7) 7.68 ÷ 6	8) 10.78 ÷ 7
9) 253.95 ÷ 15	10) 89.64 ÷ 12	11) 350.52 ÷ 23	12) 424.25 ÷ 25

B. Find the quotient

1) $4.14 \div 12$	2) $36.9 \div 15$	3) $55.5 \div 25$	4) $46.2 \div 5$
5) $3.21 \div 15$	6) $292.2 \div 12$	7) $202.4 \div 16$	8) $150.3 \div 12$
9) $67.8 \div 8$	10) $83.4 \div 8$	11) $53.9 \div 4$	12) $176.092 \div 14$

Division by 10, 100, 1000

$$4.8 \div 10 = \frac{48}{10} \times \frac{1}{10} = \frac{48}{100} = 0.48$$

$$5.35 \div 10 = \frac{535}{100} \times \frac{1}{10} = \frac{535}{1000} = 0.535$$

$$14.3 \div 100 = \frac{143}{10} \times \frac{1}{100} = \frac{143}{1000} = 0.143$$

$$68.34 \div 100 = \frac{6834}{100} \times \frac{1}{100} = \frac{6834}{10000} = 0.6834$$

$$63.48 \div 1000 = \frac{6348}{100} \times \frac{1}{1000} = \frac{6348}{100000} = 0.06348$$

From the above examples, we find that

- to divide a decimal number by 10, shift the decimal point to the left by one place;
- to divide by 100, shift the decimal point to the left by two places;
- to divide by 1000, shift the decimal point to the left by three places.

Now consider division by multiples of 10, 100, 1000.

Example 1 : $16.48 \div 20$

$$16.48 \div 20 = \frac{16.48}{20} = \frac{16.48}{10} \times \frac{1}{2} = \frac{1.648}{2} = 0.824$$

Noticė that we first divide by 10 and then by 2

Example 2 : $15.12 \div 3000$

$$15.12 \div 3000 = \frac{15.12}{3000} = \frac{15.12}{1000} \times \frac{1}{3} = \frac{0.01512}{3} = 0.00504$$

Exercise 5.15

A. Divide

1) a) $563.4 \div 10$	b) $563.4 \div 100$	c) $563.4 \div 1000$	d) $5.634 \div 10$
e) $5.634 \div 100$	f) $5.634 \div 1000$		
2) $54 \div 10$	3) $38 \div 100$	4) $7.96 \div 100$	5) $48.54 \div 100$
6) $36.329 \div 1000$	7) $348.9 \div 1000$	8) $3.9 \div 100$	9) $489 \div 1000$
10) $16.56 \div 1000$	11) $18.9 \div 100$	12) $8.9 \div 1000$	

B. Divide

1) 204.24 ÷ 20	2) 48.48 ÷ 400	3) 408.12 ÷ 30	4) 483.16 ÷ 200
5) 346.8 ÷ 2000	6) 489.3 ÷ 3000	7) 252.6 ÷ 600	8) 513.1 ÷ 70
9) 659.2 ÷ 8000	10) 39.33 ÷ 90	11) 424.25 ÷ 5000	12) 3424.28 ÷ 400

Division of a decimal or a whole number by a decimal

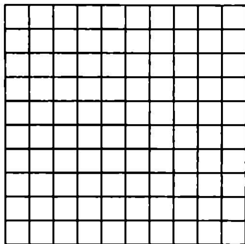


Maths Lab Activity 3

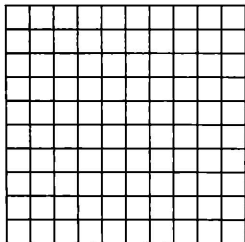
Let us find 1 ÷ 0.1.

Recall—To divide 10 by 2 you have to find how many 2s are there in 10. So to divide 1 by 0.1 you have to find how many 0.1s are there in 1.

- Take a square ruled sheet and mark 10 × 10. Consider this as a whole, that is 1



- Now shade 0.1 of 1.



- How many 0.1s are there in 10? There are 10.

Therefore, 1 ÷ 0.1 = 10

Observe that this is the same as dividing 10 by 1, i.e. finding how many 1s are there in 10.

Now similarly carry out these activities on the square ruled sheet.

1) 1 ÷ 0.01 2) 0.1 ÷ 0.01

You have learnt that a fraction remains unaltered when both its numerator and denominator are multiplied by the same number.

Example:

$$\frac{1}{4} = \frac{1 \times 3}{4 \times 3} = \frac{3}{12} = \frac{1}{4}$$

$$\frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24} = \frac{5}{6}$$

Therefore $28.8 \div 1.2 = \frac{28.8}{1.2} = \frac{28.8 \times 10}{1.2 \times 10} = \frac{288}{12} = 24$

So, to divide 28.8 by 1.2, we multiply both 28.8 and 1.2 by 10. The divisor then becomes a whole number. Dividing 28.8 by 1.2 is the same as dividing 288 by 12 and this can be done easily.

Examples :

1) $8.96 \div 1.6$ $\quad \frac{8.96}{1.6} = \frac{8.96 \times 10}{1.6 \times 10} = \frac{89.6}{16} = 5.6$

2) $1.1968 \div 0.16$ $\quad \frac{1.1968}{0.16} = \frac{1.1968 \times 100}{0.16 \times 100} = \frac{119.68}{16}$

$= 7.48$

```
      7.48
16 | 119.68
     112
      76
      64
      128
      128
        0
```

3) $8 \div 0.2 = \frac{8}{0.2} = \frac{8}{0.2} \times \frac{10}{10} = \frac{80}{2} = 40$

4) $4 \div 0.125 = \frac{4}{0.125} = \frac{4}{0.125} \times \frac{1000}{1000} = \frac{4000}{125} = 32$

To divide a decimal or a whole number by a decimal, we

(i) convert the divisor into a whole number by multiplying the dividend and divisor by 10, 100 or 1000 depending upon the number of decimal places in the divisor.

(ii) divide the new dividend by the whole number divisor.

Exercise 5.16 : Divide

A.

1) $0.288 \div 0.6$	2) $0.576 \div 0.8$	3) $0.385 \div 0.5$	4) $0.0123 \div 0.3$
5) $0.0224 \div 0.4$	6) $0.0192 \div 0.3$	7) $1.078 \div 0.7$	8) $2.456 \div 0.8$
9) $14.058 \div 1.1$	10) $25.395 \div 1.5$	11) $20.484 \div 18$	12) $18.675 \div 1.5$
13) $35.052 \div 2.3$	14) $40 \div 1.25$	15) $840 \div 0.75$	16) $963 \div 0.015$
17) $300 \div 2.5$	18) $2652 \div 4.42$	19) $80 \div 0.25$	20) $47.999 \div 0.7$

B. Word problems

1) A train covers a distance of 242.04 km in 6 hours. Find the speed of the train per hour.

2) The cost of 8 steel almirahs is ₹ 7599.44. Find the cost of each almirah.

3) The weight of 23 cement bags is 1167.5 kg. Find the weight of each bag.

4) Mr Chatterjee bought 15.5 litres of vegetable oil for ₹ 483.60. What is the cost of 1 litre of vegetable oil?

5) Alisha cut 32 metres of cloth into pieces of 0.8 m each. How many pieces did she get?

6) Mr Rao distributed ₹ 105 to children. If each child got ₹ 0.75, to how many children was the money distributed?

7) Bhola ran a 100 m race. Each of his step was of 1.25 m. In how many steps did Bhola complete the race?

• Conversion of a fractional number into a decimal

Example 1 : Convert $\frac{4}{10}$ and $\frac{3}{4}$ into decimals.

We know that $\frac{4}{10} = 4 \div 10$ $\quad$ $\frac{3}{4} = 3 \div 4$

In both cases, the quotient will be a decimal less than 1. We divide as we did earlier in the case of division of a decimal by a whole number, adding as many zeros as necessary to the right of the dividend.

```
     0.4
10 ) 4.0
     0
     ---
     4 0
     4 0
     ---
       0
```

$\frac{4}{10} = 0.4$

```
    0.75
4 ) 3.00
    0
    ----
    3 0
    2 8
    ----
     20
     20
    ----
      0
```

$\frac{3}{4} = 0.75$

Example 2 : Convert $10\frac{9}{40}$ into a decimal.

We can solve this in two ways.

Method 1 :

$10\frac{9}{40} = \frac{409}{40}$

$10\frac{9}{40} = 10.225$

```
     10.225
40 ) 409.000
     400
     -----
     09 0
      8 0
     -----
      1 00
        80
     -----
        200
        200
     -----
          0
```

Method 2 :

$10\frac{9}{40} = 10 + \frac{9}{40}$

$\frac{9}{40} = 0.225$

Therefore $10\frac{9}{40} = 10 + 0.225$

$= 10.225$

```
      0.225
40 )  9.000
      8 0
     -----
      1 00
        80
     -----
        200
        200
     -----
          0
```

Exercise 5.17 : Convert into decimals.

1) $\frac{1}{10}$	2) $\frac{1}{4}$	3) $\frac{1}{2}$	4) $\frac{1}{5}$	5) $\frac{1}{8}$
6) $\frac{1}{20}$	7) $\frac{1}{40}$	8) $\frac{1}{50}$	9) $\frac{1}{16}$	10) $\frac{1}{25}$
11) $\frac{2}{5}$	12) $\frac{5}{8}$	13) $\frac{9}{16}$	14) $\frac{10}{25}$	15) $\frac{15}{20}$
16) $1\frac{3}{4}$	17) $5\frac{5}{8}$	18) $30\frac{4}{25}$	19) $6\frac{3}{5}$	20) $\frac{19}{8}$

• Rounding decimals

Rounding to the nearest one

Consider 2.4, 2.5, 2.7.

2.4 is nearer to 2 than to 3. It is rounded to 2.

2.5 by convention should be rounded to 3.

2.7 is nearer to 3 than to 2. It is rounded to 3.

So to round off a number to the nearest one:

- We increase the digit in the ones place by 1, if the digit in the tenths place is 5, 6, 7, 8 or 9.
- We keep the digit in the ones place as it is, if the digit in the tenths place is 1, 2, 3 or 4.

Rounding to the nearest tenth (or rounding to one decimal place)

Consider 3.49, 3.54, 3.19.

3.49 is nearer to 3.5 than to 3.4. So we round it to 3.5.

3.54 is nearer to ______ than to ______ . So we round it to ______ .

3.18 is nearer to ______ than to 3.1. So we round it to ______ .

Thus to round off a number to the nearest tenth:

- We increase the digit in the tenths place by 1 if the digit in the hundredths place is 5, 6, 7, 8, 9.
- We keep the digit in the tenths place as it is if the digit in the hundredths place is 1, 2, 3 or 4.

Rounding to the nearest hundredth (or rounding to two decimal places)

Consider 4.139, 5.278, 6.943.

4.139 is nearer to 4.14 than to 4.13. So we round it to 4.14.

5.278 is nearer to ______ than to ______ . So we round it to ______ .

6.943 is nearer to ______ than to ______ . So we round it to ______ .

Try to frame the rule yourself like in the above two cases.

Example 1 : Find the value of (i) $\frac{1}{8}$ (ii) $\frac{1}{3}$ (iii) $\frac{2}{3}$ correct to two decimal places.

(i) Dividing 1 by 8 we get $\frac{1}{8} = 0.125$

Rounding to two decimal places we get $\frac{1}{8} = 0.13$

(ii) If we divide 1 by 3 to convert it into a decimal, we get an unending number 0.3333..........

Rounding to two decimal places we get $\frac{1}{3} = 0.33$

(iii) Similarly dividing 2 by 3 we get an unending decimal 0.6666..........

Rounding to two decimal places we get $\frac{2}{3} = 0.67$

Exercise 5.18

A. Round the decimal part to the nearest one.

1) 4.8 2) 3.9 3) 1.1 4) 5.5

5) 10.6 6) 11.5

B. Round the decimal part to the nearest tenth.

1) 14.56 2) 26.32 3) 15.92 4) 6.09

5) 7.13 6) 5.69

C. Round the decimal part to two decimal places.

1) 6.3925 2) 4.039 3) 5.345 4) 1.328

5) 0.561 6) 3.006 7) 23.455 8) 6.004

D. Express the following correct to two decimal places.

1) $\frac{3}{8}$ 2) $\frac{1}{16}$ 3) $\frac{3}{7}$ 4) $\frac{8}{15}$

5) $\frac{7}{8}$ 6) $\frac{3}{13}$

WORKSHEET

for formative assessment



MCQs

1. Which sentence is not true?

   a) $0.16 < 0.016$ b) $3.125 > 1.363$ c) $0.755 < 0.89$ d) $0.734 = \frac{734}{1000}$

2. What is the correct order of the decimals from least to greatest?

   a) 0.130, 0.103, 0.026, 0.02
   b) 0.026, 0.130, 0.02, 0.103
   c) 0.02, 0.026, 0.130, 0.103
   d) 0.02, 0.026, 0.103, 0.130

3. Ravi paid ₹ 260.52 for 6 litre of diesel for his truck. What was the price for each litre of diesel?

   a) ₹ 42.65 b) ₹ 43.12 c) ₹ 43.42 d) ₹ 45.30

4. When a decimal number is multiplied by 10, the decimal point moves to

   a) the right by two places
   b) the right by one place
   c) the left by two places
   d) the left by one place

5. $0.05 \times$ ______ $= 0.0025$

   a) 0.005 b) 5 c) 0.05 d) 0.5

Hots questions

1. The weight of an object on the Earth is six times its weight on the Moon. The following gives the weight of three objects on the Moon. Find their weight on the Earth.

   A poodle pup – 2.5 kg
   A girl – 4.2 kg
   A parcel – 1.8 kg

2. If $1.01 \times 11.101 = 11.21201$, find the value of

   a) 10.1×11.101

   b) 1.01×1110.1

   c) 1.01×111.01

   d) 10.1×1110.1

Fun activity

Ravi challenged Amit that decimals cannot form a magic square.
Amit made the given square.
Is it correct? Check yourself.

0.8	0.3	0.4
0.6	0.7	0.2
0.1	0.5	0.9

Write the sum for the magic square.

Metric Measures and Temperature

6

Learning Objectives



You will be able to:

- use decimals to represent metric measures.
- carry out addition, subtraction, multiplication and division of metric measures.
- state the standard units for measuring temperature.
- convert temperature from one unit to another.

Warm Up



- **Recall**

If we consider metre, litre, and gram as the units of measurement, the higher units are obtained by adding the prefixes **deca** (meaning ten), **hecto** (meaning hundred) and **kilo** (meaning thousand). The lower units are obtained by adding the prefixes **deci** (meaning tenth), **centi** (meaning hundredth) and **milli** (meaning thousandth).

Thousands 1000	Hundreds 100	Tens 10	Ones	tenths $\frac{1}{10}$	hundredths $\frac{1}{100}$	thousandths $\frac{5}{1000}$
kilo	hecto	deca	metre litre gram	deci	centi	milli

Measures of Length

10 millimetres (mm)	=	1 centimetre
10 centimetres (cm)	=	1 decimetre
10 decimetres (dm)	=	1 metre
10 metres (m)	=	1 decametre
10 decametres (dam)	=	1 hectometre
10 hectometres (hm)	=	1 kilometre (km)

Measures of Mass

10 milligrams (mg)	=	1 centigram
10 centigrams(cg)	=	1 decigram
10 decigrams (dg)	=	1 gram
10 grams (g)	=	1 decagram
10 decagrams (dag)	=	1 hectogram
10 hectograms (hg)	=	1 kilogram (kg)

Measures of Capacity

10 millilitres (mℓ) = 1 centilitre
10 centilitres (cℓ) = 1 decilitre
10 decilitres (dℓ) = 1 litre
10 litres (ℓ) = 1 decalitre
10 decalitres (daℓ) = 1 hectolitre
10 hectolitres (hℓ) = 1 kilolitre (kℓ)

Recall exercise

Fill in the blanks.

1) 1 decametre = _____ centimetres
2) 1 hectolitre = _____ decilitres
3) 3800 mg = _____ g _____ mg
4) 3848 m = _____ km _____ m
5) (32 kg 420 g) + (48 kg 325 g) + (132 kg 150 g) = _____
6) (1769 km 56 m) — (974 km 198 m) = _____

• Metric measures in decimal form

You have seen in the chapter on decimal that decimals are used in expressing metric measures. This is possible because in the metric system we measure in tens as we do in the decimal system.

The following conversion sums are done on a place value table. Note the movement of the decimal point.

kilo	hecto	deca	unit	deci	centi	milli	Conversion to higher units using decimals
		3	metre 4	7			347 dm = 34.7 m = 3.47 dam = 0.347 hm = 0.0347 km
	4	1	gram 5				415 g = 41.5 dag = 4.15 hg = 0.415 kg
			litre	7	1		71 cl = 7.1 dℓ = 0.71 ℓ = 0.071 daℓ = 0.0071 hℓ = 0.00071 kℓ

Let us express 5298.346 metre in higher and lower units.

kilometre	hectometre	decametre	metre	decimetre	centimetre	millimetre
5	2	9	8	3	4	6

Metric Measures and Temperature

6

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Thousands 1000	Hundreds 100	Tens 10	Ones	tenths $\frac{1}{10}$	hundredths $\frac{1}{100}$	thousandths $\frac{5}{1000}$
kilo	hecto	deca	metre litre gram	deci	centi	milli

Measures of Length

10 millimetres (mm)	=	1 centimetre
10 centimetres (cm)	=	1 decimetre
10 decimetres (dm)	=	1 metre
10 metres (m)	=	1 decametre
10 decametres (dam)	=	1 hectometre
10 hectometres (hm)	=	1 kilometre (km)

Measures of Mass

10 milligrams (mg)	=	1 centigram
10 centigrams(cg)	=	1 decigram
10 decigrams (dg)	=	1 gram
10 grams (g)	=	1 decagram
10 decagrams (dag)	=	1 hectogram
10 hectograms (hg)	=	1 kilogram (kg)

Measures of Capacity

10 millilitres (mℓ)	=	1 centilitre		10 litres (ℓ)	=	1 decalitre
10 centilitres (cℓ)	=	1 decilitre		10 decalitres (daℓ)	=	1 hectolitre
10 decilitres (dℓ)	=	1 litre		10 hectolitres (hℓ)	=	1 kilolitre (kℓ)

Recall exercise

Fill in the blanks.

1) 1 decametre = ______ centimetres

2) 1 hectolitre = ______ decilitres

3) 3800 mg = ______ g ______ mg

4) 3848 m = ______ km ______ m

5) (32 kg 420 g) + (48 kg 325 g) + (132 kg 150 g) = ______

6) (1769 km 56 m) — (974 km 198 m) = ______

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You have seen in the chapter on decimal that decimals are used in expressing metric measures. This is possible because in the metric system we measure in tens as we do in the decimal system.

The following conversion sums are done on a place value table. Note the movement of the decimal point.

kilo	hecto	deca	unit	deci	centi	milli	Conversion to higher units using decimals
		3	**metre** 4	7			347 dm = 34.7 m = 3.47 dam = 0.347 hm = 0.0347 km
	4	1	**gram** 5				415 g = 41.5 dag = 4.15 hg = 0.415 kg
			litre	7	1		71 cl = 7.1 dℓ = 0.71 ℓ = 0.071 daℓ = 0.0071 hℓ = 0.00071 kℓ

Let us express 5298.346 metre in higher and lower units.

kilometre	hectometre	decametre	metre	decimetre	centimetre	millimetre
5	2	9	8	3	4	6

5298.346 metre

= 529.8346 decametre

= 52.98346 hectometre

= 5.298346 kilometre

= 52983.46 decimetre

= 529834.6 centimetre

= 5298346 millimetre

Exercise 6.1

A. Express the following as a decimal of a centimetre.

1) 518 mm
2) 6 cm 7 mm
3) 8 dm 5 cm 6 mm
4) 1 mm
5) 79 mm
6) 3 dm 4 cm 1 mm
7) 18 mm
8) 102 mm
9) 8 mm
10) 4 dm 0 cm 3 mm

B. Express the following as a decimal of a gram.

1) 518 mg
2) 74 mg
3) 5 mg
4) 78 cg
5) 342 cg
6) 1703 cg
7) 5 dg 4 cg 3 mg
8) 6 g 3 dg 2 cg 5 mg
9) 7 cg 6 mg
10) 318 dg

C. Express the following as a decimal of a decalitre.

1) 4 dℓ 8 cℓ 3 mℓ
2) 4 ℓ 6 dℓ
3) 5 kℓ 5 hℓ 3 daℓ 2 ℓ
4) 2193 cℓ
5) 24 cℓ
6) 5 cℓ
7) 748 dℓ
8) 7342 mℓ
9) 340 mℓ
10) 3 mℓ

D. Express the following as a decimal of a kilometre.

1) 2 hm 3 dam 4 cm
2) 3 km 4 hm 6 dam 5 m
3) 70.486 cm
4) 3534 dam
5) 483 hm
6) 48 m
7) 432 m
8) 345 mm
9) 32 cm
10) 6 cm

• Metric measures : Addition

Example 1 : Add

4km	8hm	6dam	4m	5dm	6cm	3mm
7km	9hm	3dam	0m	3dm	2cm	1mm
2km	8hm	0dam	6m	7dm	4cm	9mm
15km	6hm	0dam	1m	6dm	3cm	3mm

Example 2

Find the total of Example 1 expressing the units in metres.

```
 4864.563 m
 7930.321 m
 2806.749 m
15601.633 m
```

Example 3

Find the total of Example 1 expressing the units in kilometres.

```
 4.864563 km
 7.930321 km
 2.806749 km
15.601633 km
```

Example 4

Find the total of Example 1 expressing the units in centimetres.

```
 486456.3 cm
 793032.1 cm
 280674.9 cm
1560163.3 cm
```

***Do it yourself*:** Find the total of Example 1 expressing the units in decametres.

• Metric measures : Subtraction

Example 1 :

Subtract 3 kg 178 g from 8 kg 350 g.

```
  8 kg 350 g
- 3 kg 178 g
  5 kg 172 g
```

Answer : 5 kg 172 g

Example 2 : Find the difference in the above example expressing the units in kilograms.

```
  8.350 kg
- 3.178 kg
  5.172 kg
```

Answer : 5.172 kg

Exercise 6.2



CD activity 5

Gotcha measure

A. Add, expressing in units indicated against each.

1) 58 kg 348 g ; 168 kg 107 g ; 564 kg 342 g (in kg)
2) 345 ℓ 56 mℓ ; 38 ℓ 346 mℓ ; 746 ℓ 34 mℓ (in ℓ)
3) 34 kg 6 hg 3 g ; 46 kg 8 hg 8 dag 7 g ; 108 kg 7 hg (in kg)
4) 34 m 6 dm 5 cm 4 mm ; 46 m 7 dm 6 cm 3 mm ; 54 m 7 mm (in m)
5) 1082 km 36 m ; 56 km 308 m ; 408 km 7 m (in km)
6) 56 m 72 cm ; 46 m 48 cm ; 9 m 50 cm (in m)
7) 36 cm 7 mm ; 72 cm 8 mm ; 8cm 2 mm (in cm)
8) 74 g 343 mg ; 56 g 408 mg ; 18 g 379 mg (in g)

B. Subtract, expressing in units indicated against each.

1) Subtract 56 kℓ 78 ℓ from 78 kℓ 5 ℓ (in kℓ)
2) Subtract 72 m 98 cm from 90 m 3 cm (in m)
3) Subtract 56 kg 182 g from 78 kg 93 g (in kg)
4) Subtract 48 kg 6 hg 5 dag 6 g from 58 kg 3 hg 2 dag 5 g (in kg)
5) Subtract 56 m 5 dm 3 cm 6 mm from 60 m 8 dm 8 cm 9 mm (in m)
6) Subtract 108 km 48 m from 1500 km (in km)
7) Subtract 48 cm 9 mm from 50 cm 3 mm (in cm)
8) Subtract 56 cm 3 mm from 60 cm 2 mm (in m)

• Metric measures: Multiplication and division

Example 1 : Multiply 9 m 6 dm 4 cm 6 mm by 15. Express the result in metres.

9 m 6 dm 4 cm 6 mm = 9.646 m

9.646 m × 15 = 144.69 m

Example 2 : Multiply 35 kg 455 g by 12. Express the result in kilograms.

35 kg 455 g = 35.455 kg

35.455 kg × 12 = 425.46 kg

Example 3 : Divide 168 km 8 m by 4. Express the result in kilometres.

168 km 8 m = 168.008 m

```
    42.002
4 | 168.008
    16
     8
     8
     0 008
         8
         0
```

The quotient is 42.002 m.

Example 4 : Divide 455 ℓ 56 cℓ by 7. Express the result in litres.

455 ℓ 56 cℓ = 455.56 ℓ

```
    65.08
7 | 455.56
    42
     35
     35
      0 56
        56
         0
```

The quotient is 65.08 ℓ.

Exercise 6.3

A. Multiply, expressing the result in units indicated.

1) 8 m 6 dm 3 cm 2 mm by 13 (in m)
2) 3 km 4 hm 5 m by 16 (in km)
3) 6 dam 5 m 4 cm by 12 (in hm)
4) 5 g 6 dg 8 cg 7 mg by 15 (in g)
5) 6 kg 7 hg 6 g 5 cg by 17 (in hg)
6) 5 dag 7 g 6 dg 5 cg by 16 (in daℓ)
7) 5 kℓ 6 hℓ 3 daℓ 4 ℓ 5 dℓ by 11 (in daℓ)
8) 6 daℓ 3 ℓ 6 dℓ 5 cℓ by 12 (in ℓ)
9) 6 ℓ 7 dℓ 5 cℓ 3 mℓ by 25 (in daℓ)
10) 5 ℓ 7 dℓ by 38 (in kℓ)

B. Divide, expressing the result in units indicated.

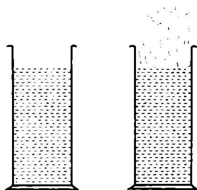
1) 409 m 56 cm by 6 (in metres)
2) 384 km 7 hm 4 dam 8 m by 4 (in km)
3) 17 hm 6 dam 5 dm by 5 (in hm)
4) 72 ℓ 56 cℓ 7 mℓ by 11 (in ℓ)
5) 38 kℓ 6 hℓ 4 ℓ by 12 (in hℓ)
6) 14 daℓ 8 ℓ by 4 (in hℓ)
7) 4 g 6 dg 7 cg 5 mg by 5 (in g)
8) 8 g 4 cg by 4 (in hg)
9) 4788 mg by 9 (in g)
10) 1785 g by 15 (in kg)

Temperature

You have already learnt how to measure length, mass, capacity and time. In this chapter you will learn about the measurement of temperature.

Concept of temperature

Take two tumblers, one containing warm (not hot!) water and the other containing cold water.



Dip the fingers of your right hand in one tumbler and the fingers of your left hand in the other.

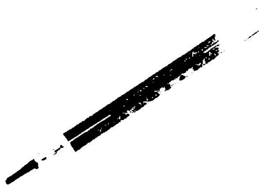
Can you feel the difference in temperature?

Can you say 'how cold' or 'how warm' the water is?

No, you cannot. You can feel the difference in temperature and say that one tumbler has warm water and the other has cold water but are not able to say 'how cold' or 'how warm' the water is.

Therefore you need an instrument called **thermometer** to measure the temperature of the water.

Thermometers can have scales in degrees Fahrenheit (°F) and in degrees Celsius (°C). The Celsius scale (also called centigrade scale) is marked from 0° to 100°. 0° shows the freezing point of water and 100° shows the boiling point of water.



The Fahrenheit scale is marked from 32° to 212° where 32° shows the freezing point of water and 212° shows the boiling point of water.

On comparing the Celsius and the Fahrenheit scales, we find

$$0°C = 32°F$$
$$\text{and} \quad 100°C = 212°F$$

• Conversion from Celsius to Fahrenheit

Let us learn to convert a given temperature from one scale to the other.

Example 1 : The temperature on a warm, sunny day was 35°C.

Convert this to the Fahrenheit scale.

(i) Multiply the number of degrees in C by 9 — $35 \times 9 = 315$

(ii) Divide the product by 5. — $\frac{315}{5} = 63$

(iii) Add 32 to the result. — $63 + 32 = 95$



$\therefore 35°C = 95°F$

• Conversion from Fahrenheit to Celsius

The steps are reversed here.

Example 2 : The temperature of a cup of hot milk was 149°F.

Convert this to the Celsius scale.

(i) Subtract 32. — $149 - 32 = 117$

(ii) Multiply the result by 5. — $117 \times 5 = 585$

(iii) Divide the product by 9. — $585 \div 9 = 65$



$\therefore 149°F = 65°C$

Exercise 6.4

A. Convert the temperatures given in the Celsius scale to the Fahrenheit scale.

1) 0°C 2) 25°C 3) 30°C 4) 40°C 5) 100°C

B. Convert the temperatures given in the Fahrenheit scale to the Celsius scale.

1) 122°F 2) 131°F 3) 140°F 4) 158°F 5) 194°F

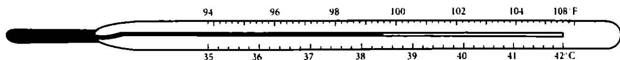


Maths Lab Activity 1 – Investigative project

Find your body temperature

A clinical thermometer is used by doctors to measure the temperature of a human body. Is the thermometer used by doctors different from the one used by you at home when you are sick?

Carefully study this thermometer. It is graded from 94°F to 108°F if it is in the Fahrenheit scale, and 35°C to 42°C if it is in the celsius scale. The silver bulb at one end is filled with mercury which expands as the temperature increases.



Reading a clinical thermometer

Shake the thermometer vigorously so as to bring the level of mercury below 98°F or 36°C.
(Note : If you have a digital clinical thermometer it has to be switched on. No shaking is required.)





Place it in your mouth below the tongue. The level of mercury rises in the tube and becomes stationary after a minute.



Remove the thermometer from the mouth and read the temperature at the present level of mercury.
What is your body temperature?



Take the temperature reading of your family members in the morning, afternoon and at night.
What did you find?
Make a project file with your findings.

WORKSHEET
for formative assessment



MCQS

1. The amount of water in a bath tub is about 50_____

   a) millilitres   b) kilolitres   c) litres   d) centilitres

2. The distance between the hospital and railway station in a city is about 10 _______

   a) m   b) km   c) cm   d) kg

3. The symbol used to measure temperature in degree Celsius is _____

   a) C   b) F   c) °C   d) °F

4. What is the reading in a thermometer when water starts freezing?

   a) 32°F   b) 0°F   c) 212°F   d) 100°C

5. Which of these makes a metric unit the biggest?

   a) deci   b) deca   c) hecto   d) kilo

Hots questions

1. These are the temperatures of some cities in India taken at 12 noon on a day in April. (life skill)

City	Temperature °C	City	Temperature °C
Chennai	37°C	Shimla	27°C
Bangalore	35°C	Goa	32°C
New Delhi	39°C	Manali	1°C
Kolkata	38°C	Kodaikanal	26°C
Mumbai	32°C		

a) Which is the coldest city?

b) If you want to go on a vacation to two of the cities in April, which two cities will you choose? why?

c) Which is the hottest city?

d) In which city will you require heavy woollen clothes?

e) Which has more pleasent weather—New Delhi or Shimla?

Fun activity

How fast can you run?

Run a distance of 100m in your school field as fast as you can. Take the help of a friend to measure the time you take, using a digital watch. Find out the distance you can run in 1 hour if you run at the same speed.

Geometry

7

Learning Objectives



You will be able to:

- define/explain simple geometrical concepts such as planes, angles, intersecting, parallel and perpendicular lines, triangles, quadrilaterals and circles.
- measure and draw angles using a protractor/scale.
- draw specific angles and bisect an angle using a ruler and compass.
- draw perpendicular and parallel lines using set square and ruler.
- recognise the different types of triangles and quadrilaterals.
- construct a circle of given radius using a compass.
- calculate radius/diameter/circumference, given one of them.

Warm Up



- **Recall–geometrical concepts**

A **line segment** is a straight line that has a beginning and an end.



The line segment shown here is called line segment AB or $\overline{AB}$.

A line segment extending endlessly on both sides is called a **line**.

Since a piece of paper is limited in surface, a line cannot be drawn on its surface.

A line can only be represented on it.

Draw a line segment XY and extend it on both sides.



Put two arrow marks on either end.

This is called line XY and is written as $\overleftrightarrow{XY}$. X and Y are any two points on the line.

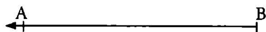
A ray is a part of a line that extends endlessly in one direction only.

A ray cannot be drawn on paper. It can only be represented on it. To represent a ray, draw a line segment AB and extend it in one direction only. Put an arrow mark on one end.

This is called ray AB and written as $\overrightarrow{AB}$.



This is ray BA written as $\overrightarrow{BA}$.

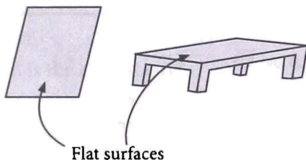


Let us now tabulate the differences between a line segment, a line and a ray.

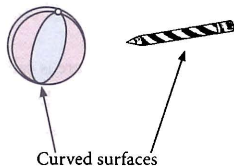
	A line segment	***A line***	***A ray***
1.	We **can draw** a line segment on the surface of a paper	We **cannot draw** a line on a paper but can only represent it.	We **cannot draw** a ray on a paper but can only represent it.
2.	A line segment **has a definite length.**	A line **does not have a definite length.**	A ray **does not have a definite length.**
3.	A line segment **has 2 end-points.**	A line **does not have end-points.**	A ray **has only one end-point.**
4.	A B	A B	A B
	The above line segment is represented as line segment AB or $\overline{AB}$. It can also be represented as line segment BA or $\overline{BA}$.	The above line is represented as line AB or $\overleftrightarrow{AB}$. It can also be represented as line BA or $\overleftrightarrow{BA}$.	The above ray is represented only as ray AB or $\overrightarrow{AB}$.

• Concept of a plane

The surface of this paper is flat. So is the surface of a table. But the surface of a ball is curved.



Flat surfaces



Curved surfaces

A flat surface gives the idea of a plane.

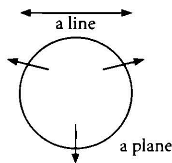
You know that a line extends endlessly on both sides.

In the same way a plane extends endlessly on both sides.

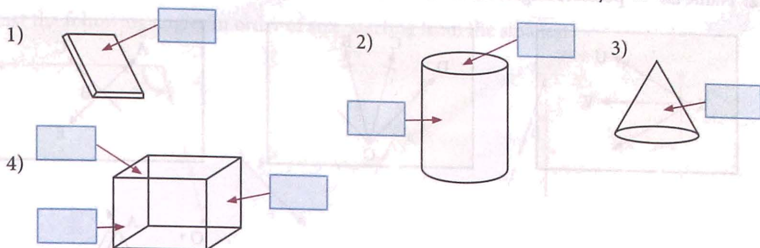
Just as you cannot represent a line on paper, you cannot represent a plane either.

You can only show a portion of it.

The surface of a sheet of paper, a table top, or the surfaces of the walls of a room are examples of plane surfaces.



Which of the surfaces marked by arrows are portions of planes? Write 'yes' or 'no'.

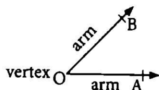


• Angles

When two rays meet at a point, an **angle** is formed.

The points where the two rays meet is called the **vertex**.

The rays form the **arms** of the angle.

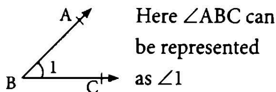


This angle has vertex O and arms OB and OA. It is called angle BOA or ∠BOA. It can also be named angle AOB or ∠AOB.

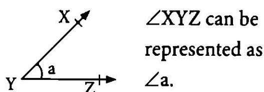
The symbol ∠ represents the word 'angle'.

Remember, while naming an angle, the vertex is always in the centre.

We can also name an angle in a different manner. Consider the following angles.



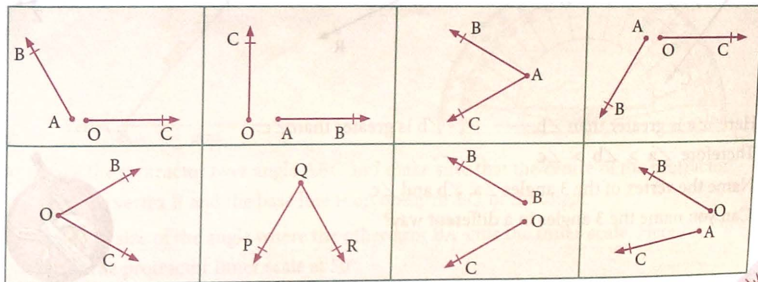
Here ∠ABC can be represented as ∠1



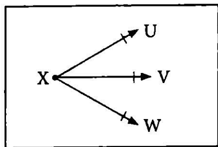
∠XYZ can be represented as ∠a.

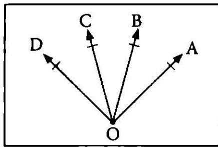
Exercise 7.1

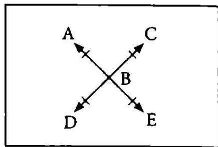
1. Which of the following figures represent an angle?



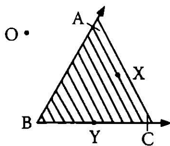
2. Name all the possible angles formed in each of the following figures.







• Interior and exterior of angles

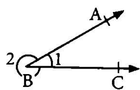


The shaded portion between the arms BA and BC of the angle ABC can be extended indefinitely.

This portion is called the **interior** of the angle ABC.
X is a point in the interior of the angle.

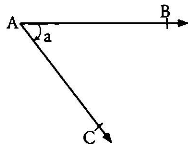
The point O lies in the exterior (or outside) of the angle. The point Y lies on the angle.

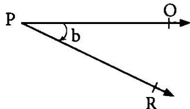
Whenever two rays meet, two angles are formed, an interior angle and an exterior angle.

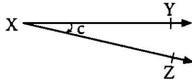


Here $\angle 1$ is called the **interior angle.**
$\angle 2$ is called the **exterior angle.**

The size of an angle is measured by the amount of its turn or rotation, not by the length of the arms.





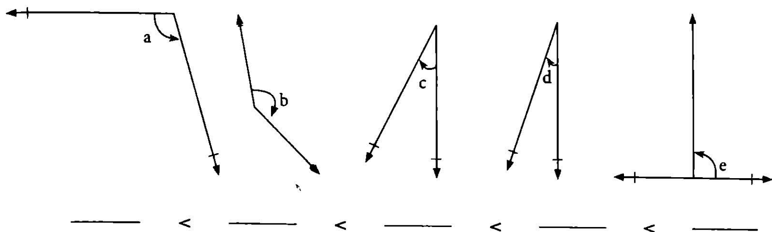


Here $\angle a$ is greater than $\angle b$. $\angle b$ is greater than $\angle c$.
Therefore $\angle a > \angle b > \angle c$
Name the vertex of the 3 angles $\angle a$, $\angle b$ and $\angle c$.
Can you name the 3 angles in a different way?



Exercise 7.2

List the following angles in order of size, starting from the smallest.

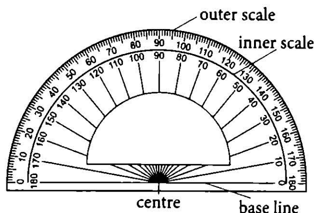


_____ < _____ < _____ < _____ < _____

• Measuring angles

The standard unit for measuring an angle is the **degree.** The mathematical symbol for degree or degrees is °.

To measure an angle in degrees, we use a **protractor.** Here is a protractor. You will find it in your geometry box.

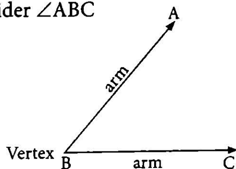


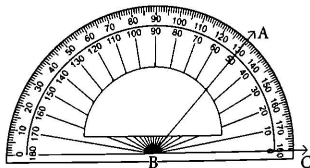
The protractor has two scales on it. An **inner scale** and an **outer scale** of numbers beginning from 0 and going up to 180.

The protractor can therefore be read from left to right or right to left. It also has a **centre** and a **baseline** joining the centre to 0°.

Using a **protractor for measuring angles**

Consider ∠ABC

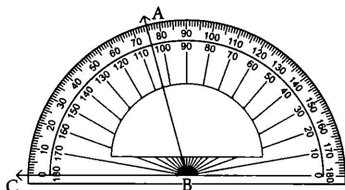




- Place the protractor over angle ABC and make sure that the centre of the protractor is on the vertex B and the base line is on one arm $\overrightarrow{BC}$ of the angle.
- Read the size of the angle where the other arm $\overrightarrow{BA}$ cuts the **inner scale.** Here $\overrightarrow{BA}$ meets the protractor inner scale at 50°.

We write this as m $\angle ABC = 50°$ where m stands for 'measure of the angle'.
Notice that in this case the angle has to be read on the inner scale. As a rule, ***always use the scale where the arm on the baseline point to 0.***

An angle where the arm on the baseline points to the left, is read on the outer scale.



m $\angle ABC = 75°$

Exercise 7.3

Measure the following angles.

1) A, B, C

2) A, O, B

3) P, Q, R

4) L, M, N

5) X, Y, Z

6) A, O, B

7) A, B, C

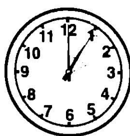
8) A, D, B

9) X, Z, Y



Maths Lab Activity 1

Look at the clock below.



The hands of the clock turn through 360° when they travel from 12 and come back to 12.

At 1 o' clock, the angle between the long hand and the short hand is 30° since $360° \div 12 = 30°$.

At 2 o' clock, the angle between the hands is 60° since $30° \times 2 = 60°$.

1) How many degrees does the minute hand of a clock turn through in one hour? ________

2) How many degrees does the minute hand turn through in 5 minutes? ________

3) How many degrees does the minute hand turn through in a quarter of an hour? ________

4) How many degrees does the hour hand turn through in 5 hours? ________

5) How long does the hour hand take to turn through 360°? ________

6) Through how many degrees does the hour hand turn in six hours? ________

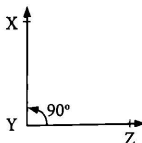
7) How many degrees does the hour hand turn through when it moves from 5 to11? ________

8) How many degrees does the minute hand turn through when it moves from 5 to 11? ________

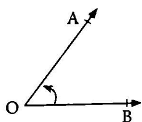
9) The hour hand turns through ________ degrees when it moves from 4 to 8.

10) The minute hand turns through ________ degrees when it moves from 10 to 5.

- ## Type of angles

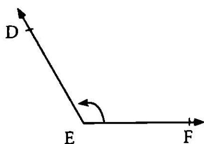


A **right angle** is an angle which measures 90°.



An **acute angle** measures between 0° and 90°.

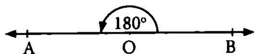
It is less than a right angle.



An **obtuse angle** measures between 90° and 180°. It is more than a right angle.



An angle measuring 0° is called a **zero angle.**



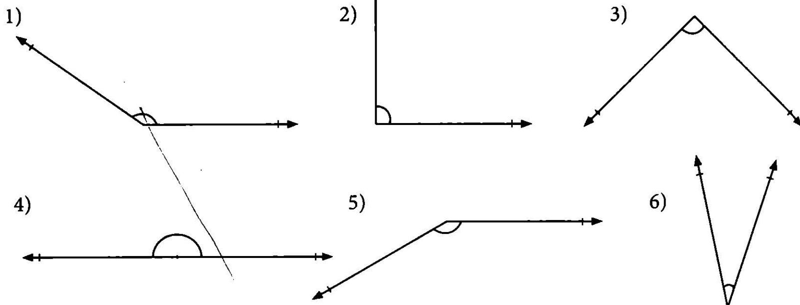
An angle measuring 180° is called a **straight angle.**



CD activity 6
Radar love

Exercise 7.4

Measure and identify the types of angles.



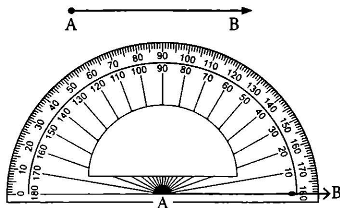
• Constructing angles

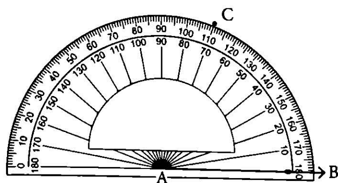
We use a protractor to measure an angle. We also use it to draw an angle of a given measurement.

Let us draw an angle of 70°

Draw a ray AB.

Place the protractor on the ray AB, with its centre on A and its base line along ray AB.





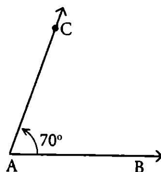
Start from 0° and read the 70° marking on the **inner** scale on the protractor.

Make a point against the 70° marking.

Remove the protractor and draw a ray from the vertex A through the point C.

Mark the angle 70°.

∠CAB = 70°



Exercise 7.5

Use your protractor to draw these angles.

1) 40°	2) 45°	3) 125°	4) 25°
5) 35°	6) 60°	7) 120°	8) 150°
9) 90°	10) 105°	11) 10°	12) 30°

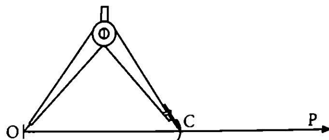
• Construction using compass and ruler

1. To construct a line segment congruent (equal in measure) to another line segment.

Let AB be the given line segment.

It is required to construct a line segment equal to AB in length.



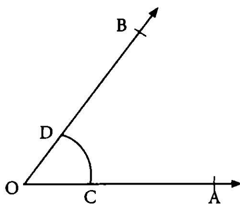


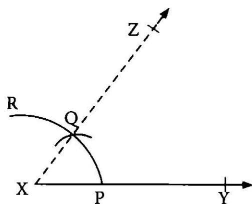
Let OP be a ray. Measure with your compass a length equal to AB.
Put the metal point of your compass at O and cut off an arc along OP with the pencil end. Mark this point C.

Now OC is equal to AB in length.

AB and OC are congruent line segments.

2. To construct an angle congruent (that is, equal in measure) to a given angle.





Let ∠AOB be the given angle.

- With O as centre and a convenient radius, draw an arc, cutting OA and OB at C and D respectively.
- Now take any ray XY. With X as centre and the same radius as before draw an arc PR cutting XY at P.
- With P as centre and radius equal to CD draw an arc, cutting the arc PR at Q.
- Join XQ and extend it to Z.

  ∠YXZ is congruent to ∠AOB.

Exercise 7.6

A. Draw line segments in your notebook congruent to the line segments given below.

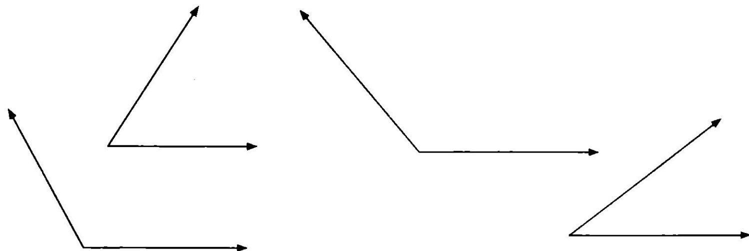
A ⊢————⊣ B

C ⊢————⊣ D

E ⊢————⊣ F

X ⊢————⊣ Y

B. Construct angles in your notebook congruent to the ones give below.



• Bisecting angles

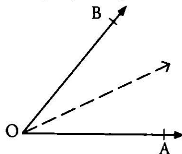
Bisecting an angle means dividing it into two equal halves. The ray which bisects an angle is known as its **bisector.**



Maths Lab Activity 2

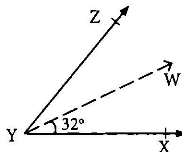
To draw the bisector of an angle

By paper folding: Bisect ∠AOB.



Fold the paper so that OA falls along OB and press the paper in this position so as to get an impression (a crease). Unfold the paper. Draw the line along the impression. This line bisects ∠AOB.

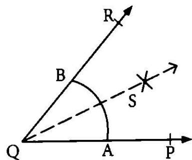
Using a protractor: Bisect ∠XYZ.



Measure ∠XYZ. Let it be 64°.

Half of 64° is 32°. Make ∠XYW = 32° so that YW falls within ∠XYZ. Now ∠XYZ is divided into two equal halves by the line YW.

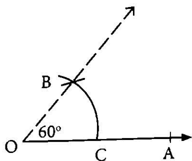
Using a compass: Bisect ∠PQR.



Place the metal end of the compass at Q and draw an arc to cut QP at A and QR at B.

- Place the metal end at A and with any convenient radius, draw an arc.
- Now place the metal point at B and with the same radius draw another arc cutting the first arc at S.
- Join Q to S. QS bisects ∠PQR.

To construct an angle of 60°



- Take any ray OA. Now with O as centre and any convenient radius draw an arc cutting OA at C.
- With C as centre and the same radius draw an arc, cutting the first arc at B.
- Join OB. ∠AOB = 60°

Exercise 7.7

A. Make the following angles on a sheet of paper and bisect each one of them by the paper-folding method.

1) 72°   2) 36°   3) 84°   4) 60°   5) 90°

B. Make the following angles in your notebook and bisect each one of them by using your protractor.

1) 64°   2) 48°   3) 110°   4) 56°   5) 44°

C. Make the following angles in your notebook and bisect each one of them by using your compass.

1) 78°   2) 108°   3) 110°   4) 66°   5) 45°

D. Make an angle of 60° using compass and ruler. Bisect it.

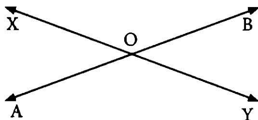
• Type of lines

Intersecting lines

Lines AB and XY meet at point O.

We say that they **intersect** at O.

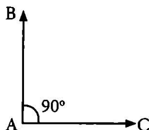
AB and XY are **intersecting lines.**



Perpendicular lines

When two lines intersect and make a right angle, they are said to be **perpendicular** to each other.

$\overline{AB}$ is perpendicular to $\overline{AC}$.

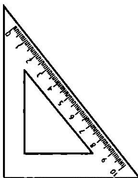


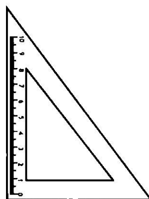
Open your geometry box. Other than a ruler and a protractor, what does it contain?

Set squares

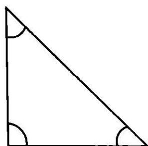
There are two triangular objects.

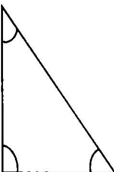
These are called **set squares.**



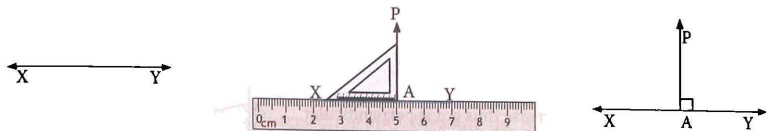


Trace their shapes and measure the angles.



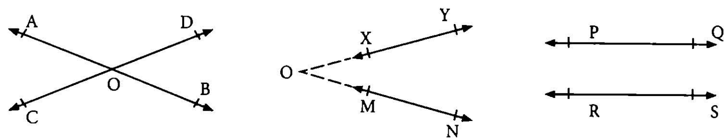


These set squares are used to draw perpendiculars.
Draw a line XY. Place a ruler along XY.
Fix the right angle of the set square along the edge of the ruler and draw a line.



$\overline{AP}$ is perpendicular to line XY.

Parallel lines



Consider the three pairs of lines above. AB and CD meet (or intersect) at O.
$\overleftrightarrow{XY}$ and $\overleftrightarrow{MN}$ also intersect at O when extended.
$\overleftrightarrow{PQ}$ and $\overleftrightarrow{RS}$ do not intersect no matter how much you extend them on both sides.
$\overleftrightarrow{PQ}$ and $\overleftrightarrow{RS}$ are said to be **parallel lines.**

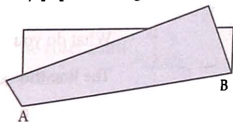
Two lines in the same plane are parallel if they do not intersect each other.



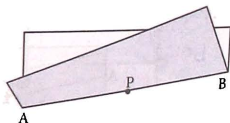
Maths Lab Activity 3

To fix a perpendicular through a point on a given line by paper folding.

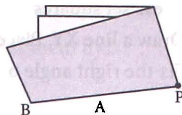
- Take a sheet of paper and fold it to form a crease. Let this be the given line AB.



- Now mark a point P on line AB.

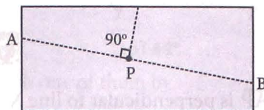


- Fold the sheet at P such that AP and PB overlap.



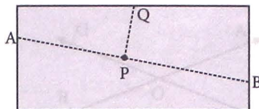
- Open out the fold.

  The second crease thus got is perpendicular to AB at P.

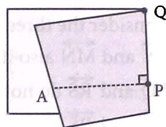


To draw line parallel to AB by paper folding

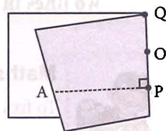
- Now extend the crease on P.
- Let this second crease be line PQ.



- Fold the sheet along PQ.



- Mark a point O on the PQ.

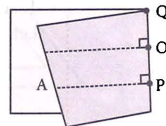


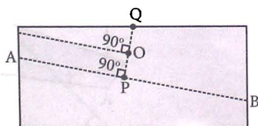
- Now fold the sheet at O such that PO and OQ overlap.

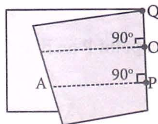
  This crease is perpendicular to PQ.
  What do you notice?

  The line thus got is parallel to line AB.

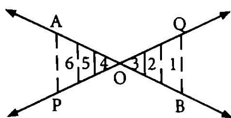
  Two perpendiculars to a line are parallel to each other.

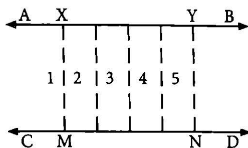






Distance between lines





AOB and POQ are two lines, intersecting at O. Measure the distances 1, 2, 3, 4, 5 and 6 between these lines, at different points. You will find that these distances are not the same.

Draw lines AB and CD alongside the two edges of a ruler as shown here. These are parallel to each other.

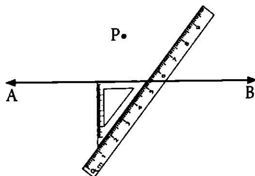
Draw lines 1, 2, 3, 4, 5 perpendicular to the parallel lines AB and CD. Measure these lines. They will be equal.

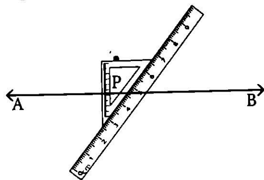
The distance between two parallel lines always remains the same.

To draw a line parallel to a given line, through a given point using a set square

AB is the given line and P the given point. Place one edge of your set square along AB as shown.

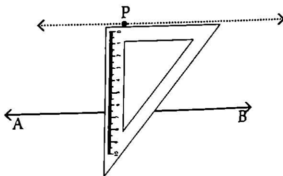
Place your ruler along the slant side of the set square as shown.





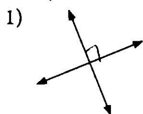
Hold the ruler firmly and slide the set square along the side of the ruler until the top edge touches the point P.

Draw a line along the top edge of the set square in this position. This line is parallel to AB.

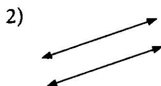


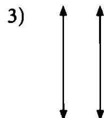
Exercise 7.8

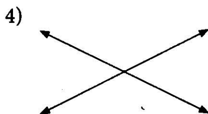
A. Indicate whether the lines are parallel, perpendicular or intersecting. One is done for you.

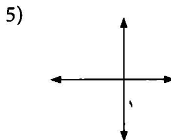
1) 

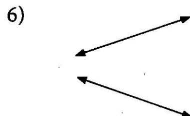
Intersecting, perpendicular

2) 

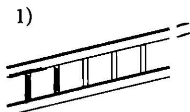
3) 

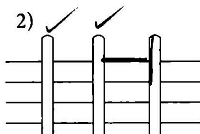
4) 

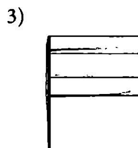
5) 

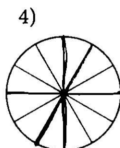
6) 

B. What kind of lines are present in each of the following figures?

1) 

2) 

3) 

4) 



- **Polygons**

A closed shape with any number of straight sides is a polygon.

Here are some polygons.

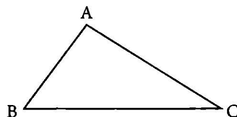
    

Three-sided polygons are called **triangles.** 'Tri' means three.

The triangle A, B, C is written as Δ ABC.

The symbol 'Δ' stands for a triangle.

A triangle has 3 sides, 3 angles and 3 vertices.

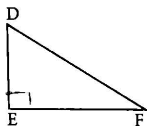


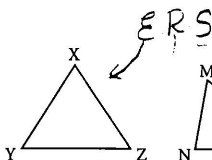
The sides of Δ ABC are AB, BC and AC.

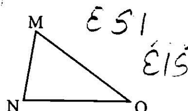
The vertices are A, B and C.

The angles are ∠ ABC, ∠ ACB and ∠ BAC.

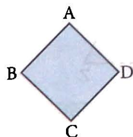
Here are some more triangles. Name their sides, angles and vertices.

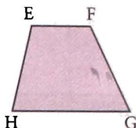


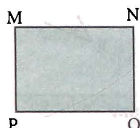


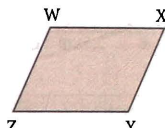


A four-sided polygon is a **quadrilateral.** 'Quad' means four.





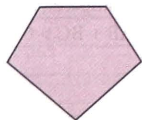


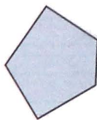


A quadrilateral has 4 sides, 4 angles and 4 vertices.

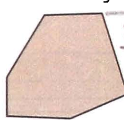
Can you name the sides, angles and vertices of quadrilateral ABCD?

Look at these polygons.







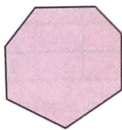


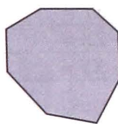
5 sided polygons are called **pentagons.**

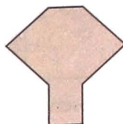
They have 5 angles and 5 vertices.

Hexagons have 6 sides.

They have 6 angles and 6 vertices







A 7 sided polygon is a **septagon.**

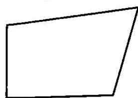
It has 7 angles and 7 vertices.

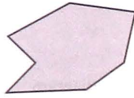
These are **octagons.**

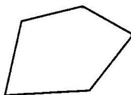
How many sides do they have?

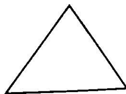
How many angles and vertices?

Identify the polygons.



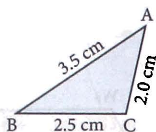


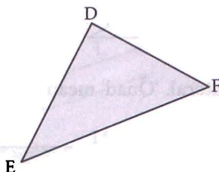


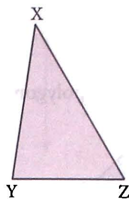


• Properties of a triangle

Measure the sides of the triangles given below and fill in the table.







Triangle	Side one	Side two	Side three
Δ ABC	AB =	BC =	CA =
Δ DEF	DE =	EF =	FD =
Δ XYZ	XY =	YZ =	ZX =

Now fill in the following table.

	(1)	(2)	Compare (1) and (2)
In Δ ABC	AB + BC = 6 cm	CA = 2 cm	AB + BC > CA
	CA + BC =	AB =	
	AB + CA =	BC =	

In Δ DEF	DE + EF =	FD =	
	EF + FD =	DE =	
	ED + DF =	EF =	

In Δ XYZ	XY + YZ =	ZX =	
	YZ + ZX =	XY =	
	ZX + XY =	YZ =	

What do you observe?

What do you conclude?



The sum of the lengths of any 2 sides of a triangle is greater than the third side.

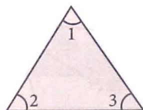


Maths Lab Activity 4

Draw a triangle on a paper.

Cut out the triangle.

Mark the three angles 1, 2 and 3 as in the diagram.



Tear off each angle as shown.

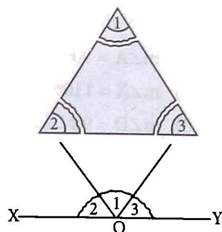
Stick the three angles in your book like this.

What do you observe?

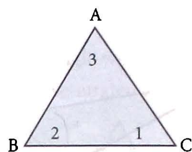
The arms OX, OY lie along a straight line.

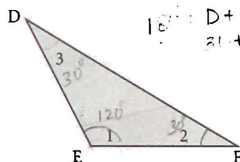
Together they make 180°.

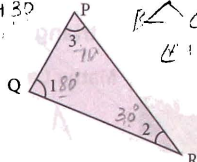
$\angle 1 + \angle 2 + \angle 3 = 180°$



Measure the angles of these triangles and fill in the table to verify the above result.







	$\angle 1$	$\angle 2$	$\angle 3$	$\angle 1 + \angle 2 + \angle 3$
Δ ABC				
Δ DEF				
Δ PQR				

The table proves that:

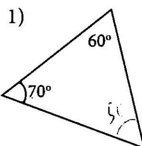
The angles of a triangle add up to 180°



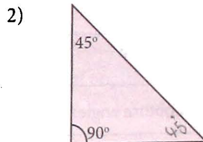
Exercise 7.9

A. For each triangle calculate the size of the unmarked angle.

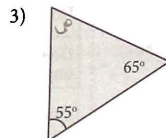
1)



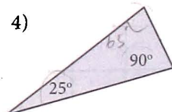
2)



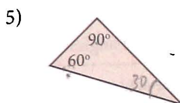
3)



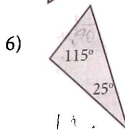
4)



5)



6)



B. Which of the following cannot be the measures of three angles of a triangle?

1) $m\angle A = 90°$ $m\angle B = 90°$ $m\angle C = 20°$
2) $m\angle X = 110°$ $m\angle Y = 90°$ $m\angle Z = 10°$
3) $m\angle D = 98°$ $m\angle E = 48°$ $m\angle F = 34°$
4) $m\angle L = 68°$ $m\angle Q = 110°$ $m\angle R = 12°$
5) $m\angle G = 86°$ $m\angle H = 42°$ $m\angle I = 52°$

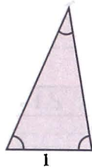
C. Length of three line segments are given. In which case is it possible to construct a triangle?

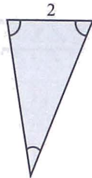
1) 8 cm, 9 cm, 5cm
2) 16 cm, 7 cm, 8 cm
3) 5 cm, 6 cm, 9 cm
4) 4 cm, 10 cm, 8 cm
5) 6 cm, 6 cm, 13 cm
6) 5 cm, 6 cm, 7 cm

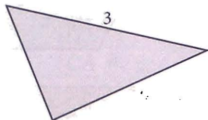
• Types of triangles

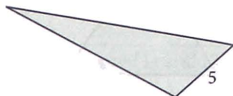


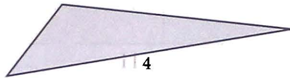
Maths Lab Activity 5

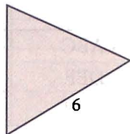












Look at the above triangles and then fill in the table below. Write ✓ to denote YES and ✗ to denote NO.

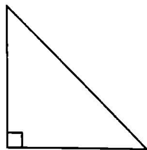
Shape	1	2	3	4	5	6
Does the triangle have a right angle?						
Does the triangle have more than one right angle?						
Does the triangle have an obtuse angle?						
Does the triangle have more than one obtuse angle?						
Does the triangle have two acute angles?						
Does the triangle have three acute angles?						

Now answer the following questions.

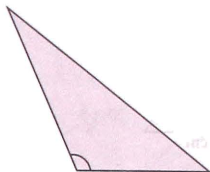
1) How many right angles can a triangle have? __________

2) How many obtuse angles can a triangle have? __________

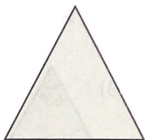
3) How many acute angles can a triangle have? __________



A triangle with one right angle is called a right-angled triangle. The right angle is often marked as shown.

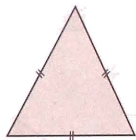


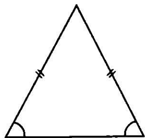
A triangle with one obtuse angle is called an **obtuse-angled triangle.**



A triangle with all three angles acute is called an **acute-angled triangle.**

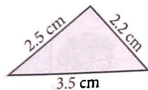
A triangle with its three sides equal is called an **equilateral triangle.** It also has three equal angles. How many degree is each angle? __________





A triangle with two equal sides is called an isosceles triangle. It has two equal angles.

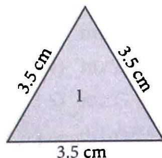
A triangle having all sides of different length is a scalene triangle. Measure the sides to verify yourself.

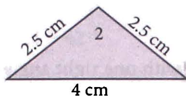


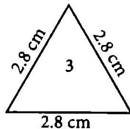
Exercise 7.10

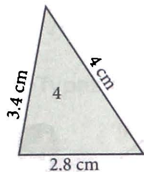


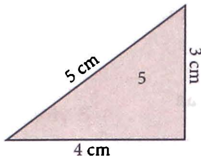
A. Classify the following triangles with respect to their sides.

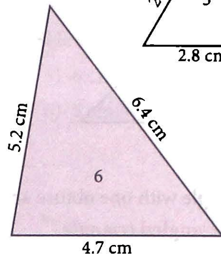






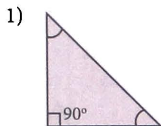




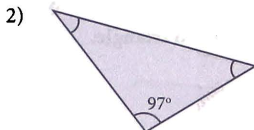


B. Classify the following triangles with respect to their angles.

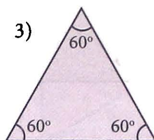
1)



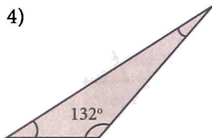
2)



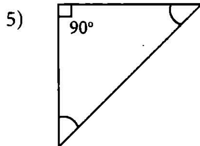
3)



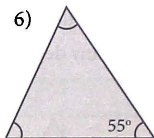
4)



5)

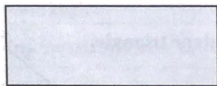


6)



• Types of quadrilaterals

A four-sided polygon is a quadrilateral. The quadrilateral family is a large one. Here are some special quadrilaterals.



Rectangle

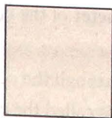
All angles are right angles.
Opposite sides are parallel.
Opposite sides are equal.

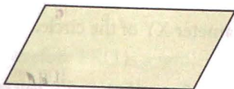
Square

All angles are right angles.

Opposite sides are parallel.

All sides are equal.





Parallelogram

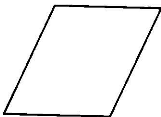
Opposite sides are parallel.

Opposite sides are equal.

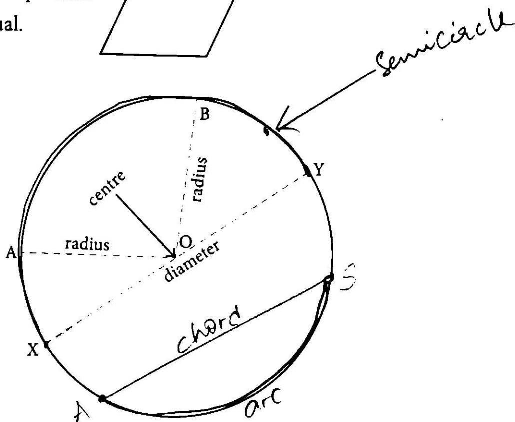
Rhombus

Opposite sides are parallel.

All sides are equal.



• Circles



A circle is also a closed figure. But it is not bounded by straight line segments. It is bound by a curved line.

Every point on this curved line is at equal distance from a fixed point inside the circle. This fixed point O is the centre of the circle.

The perimeter of the circle is called its **circumference.** A and B are two points on the circle. They are at the same distance from the centre O.

$$\overline{OA} = \overline{OB}$$

This distance between the centre and any point on the circle is called its **radius.**



Now consider the line segment XY passing through the centre O. The end points X and Y are on the circle. XY is known as the **diameter** of the circle.



Thus a line segment passing through the centre of the circle, whose end points lie on the circle is called the **diameter** of the circle.

Measure the radius OA and the diameter XY of the circle. What do you notice?

The diameter of a circle is twice the radius.



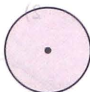
- **Chord of a circle**



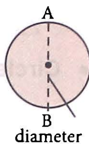
Maths Lab Activity 6

Draw a circle and cut it out.

Fold it in half and open the fold. We get the diameter AB passing through the centre of the circle. Its end points lie on the circle.

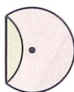


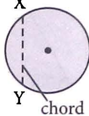




Draw another circle and cut it out. Fold it as shown. Open the fold. We get XY which does not pass through the centre. Its end points lie on the circle.

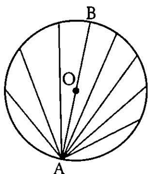






A line segment whose end points lie on the circle is called a **chord**.

Both AB and XY are chords.



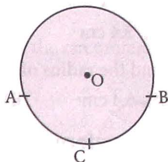
You can draw large number of chords starting from a point A on the circumference of a circle. But only one of these chords passes through the centre O.

Measure the lengths of the chords. You will find the chord AB is the longest chord.
But AB is also the diameter of the circle.

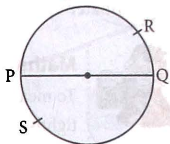
Thus, **the diameter is the longest chord of a circle.**

• Arc and semicircle

Any part of a circle is called an **arc** of the circle. We usually name an arc by 3 points where 2 points are the end points and there is a point in between them. Look at the figure. ACB is an arc of the given circle.



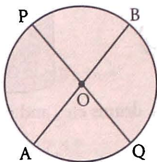
Half a circle is a **semicircle,** therefore PRQ is a semicircle. PSQ is also a semicircle. Note that a semicircle is also an arc of a circle.



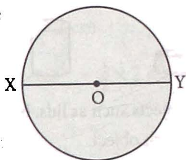
Exercise 7.11

A. Name the radii and diameters of the circles.

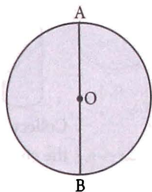
1)



2)

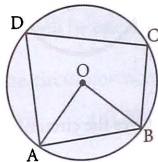


3)

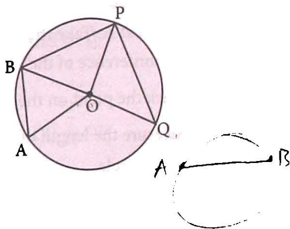


B. Name the chords.

1)



2)



C. Fill in the blanks.

1) A diameter is the Biggest chord of a circle.

2) A and B are 2 points on a circle. Line segment AB is called a Chord of the circle.

3) Perimeter of a circle is called the Circumference of the circle.

4) Radius of a circle is half the length of the diameter of the circle.

D. Find the diameter of a circle whose radius is:

(i) 5.4 cm (ii) 3.6 cm (iii) 4.8 cm (iv) 5 m (v) 6.3 cm

E. Find the radius of a circle whose diameter is:

(i) 6.4 cm (ii) 8 cm (iii) 4.6 cm (iv) 5 m (v) 10 km

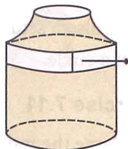
• Circumference of a circle

The perimeter of a circle is called the **circumference.**



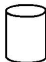
Maths Lab Activity 7

To measure the circumference, let us wrap a strip of paper tightly round the object, overlapping the ends. Pierce the paper at the overlap with a pin. Open out the paper strip and measure the distance between the pin holes. This gives us the circumference of the object.

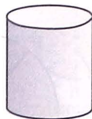






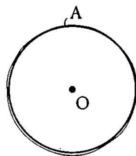






Collect some round objects such as lids, bottles, tumblers, drums etc., and measure the circumference of each object.

You can measure the circumference of a circle by using a piece of thread. Mark a point A on the circle. Keep one end of the thread at A. Take the thread along the circumference of the circle.



Mark the point on the thread which again falls on A.

Measure the length of the thread upto this point. This gives the circumference of the circle.

• Finding circumference

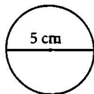
Draw several circles. Measure the circumference and the diameter of each. Divide the circumference of each with its diameter. Is your answer in each case between 3 and 3.3? If you measure the circumference very accurately you will find that in every case:

$$\frac{\text{circumference}}{\text{diameter}} = 3.14 \text{ or } \frac{22}{7}$$

This makes it much easier to find the circumference of a circle.

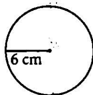
Measure the diameter of the circle and multiply it by 3.14 or $\frac{22}{7}$ to get the circumference.

Example 1 : The diameter of a circle is 5 cm. Find the circumference.



Circumference $= 5 \times 3.14$ cm $= 15.7$ cm

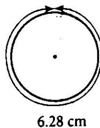
Example 2 : The radius of a circle is 6 cm. Find its circumference.



Circumference $=$ diameter $\times 3.14 = 2 \times$ radius $\times 3.14$

$= 2 \times 6 \times 3.14$ cm $= 37.68$ cm

Example 3 : Find the diameter and radius of a circle with circumference = 6.28 cm



Diameter $=$ circumference $\div 3.14$

$= \frac{6.28}{3.14}$ cm $= 2$ cm

Radius $= \frac{1}{2} \times$ diameter $= \frac{1}{2} \times 2$ cm $= 1$ cm

Exercise 7.12

3·14 = 7/22

22/7 = 3·14

A. Find the circumference of a circle whose diameter is

(i) 10 cm (ii) 5.5 cm (iii) $\frac{7}{22}$ cm (iv) 3.5 cm (v) 3.2 cm

[*Hint* : It will be easier to use $\frac{22}{7}$ instead of 3.14 in (iii) and (iv)]

B. Find the circumference of a circle whose radius is

(i) 2.1 cm (ii) 20 cm (iii) 5 m (iv) 7.7 cm (v) $\frac{7}{22}$ cm

C. Find the radius of a circle whose circumference is

(i) 15.4 cm (ii) 3.14 cm (iii) 4.4 cm (iv) 22 m (v) 15.7 cm

D. Find the diameter of a circle whose circumference is

(i) 4.4 m (ii) 6.6 cm (iii) 11 cm (iv) 31.4 cm (v) 15.7 cm

[In B, C and D use 3.14 or $\frac{22}{7}$ depending on ease of calculation]

D. Find the diameter of a circle whose radius is:

(i) 5.4 cm (ii) 3.6 cm (iii) 4.8 cm (iv) 5 m (v) 6.3 cm

E. Find the radius of a circle whose diameter is:

(i) 6.4 cm (ii) 8 cm (iii) 4.6 cm (iv) 5 m (v) 10 km

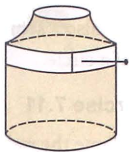
• Circumference of a circle

The perimeter of a circle is called the **circumference.**



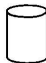
Maths Lab Activity 7

To measure the circumference, let us wrap a strip of paper tightly round the object, overlapping the ends. Pierce the paper at the overlap with a pin. Open out the paper strip and measure the distance between the pin holes. This gives us the circumference of the object.

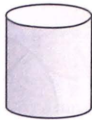






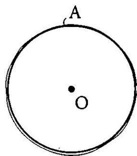






Collect some round objects such as lids, bottles, tumblers, drums etc., and measure the circumference of each object.

You can measure the circumference of a circle by using a piece of thread. Mark a point A on the circle. Keep one end of the thread at A. Take the thread along the circumference of the circle.



Mark the point on the thread which again falls on A.

Measure the length of the thread upto this point. This gives the circumference of the circle.

• Finding circumference

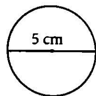
Draw several circles. Measure the circumference and the diameter of each. Divide the circumference of each with its diameter. Is your answer in each case between 3 and 3.3? If you measure the circumference very accurately you will find that in every case:

$$\frac{\text{circumference}}{\text{diameter}} = 3.14 \text{ or } \frac{22}{7}$$

This makes it much easier to find the circumference of a circle.

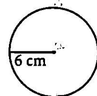
Measure the diameter of the circle and multiply it by 3.14 or $\frac{22}{7}$ to get the circumference.

Example 1 : The diameter of a circle is 5 cm. Find the circumference.



Circumference $= 5 \times 3.14$ cm $= 15.7$ cm

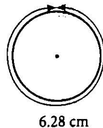
Example 2 : The radius of a circle is 6 cm. Find its circumference.



Circumference $=$ diameter $\times 3.14 = 2 \times$ radius $\times 3.14$

$= 2 \times 6 \times 3.14$ cm $= 37.68$ cm

Example 3 : Find the diameter and radius of a circle with circumference = 6.28 cm



6.28 cm

Diameter $=$ circumference $\div 3.14$

$= \frac{6.28}{3.14}$ cm $= 2$ cm

Radius $= \frac{1}{2} \times$ diameter $= \frac{1}{2} \times 2$ cm $= 1$ cm

Exercise 7.12

$3.14 = \frac{7}{22}$

$\frac{22}{7} = 3.14$

A. Find the circumference of a circle whose diameter is

(i) 10 cm (ii) 5.5 cm (iii) $\frac{7}{22}$ cm (iv) 3.5 cm (v) 3.2 cm

[*Hint* : It will be easier to use $\frac{22}{7}$ instead of 3.14 in (iii) and (iv)]

B. Find the circumference of a circle whose radius is

(i) 2.1 cm (ii) 20 cm (iii) 5 m (iv) 7.7 cm (v) $\frac{7}{22}$ cm

C. Find the radius of a circle whose circumference is

(i) 15.4 cm (ii) 3.14 cm (iii) 4.4 cm (iv) 22 m (v) 15.7 cm

D. Find the diameter of a circle whose circumference is

(i) 4.4 m (ii) 6.6 cm (iii) 11 cm (iv) 31.4 cm (v) 15.7 cm

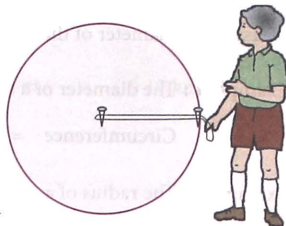
[In B, C and D use 3.14 or $\frac{22}{7}$ depending on ease of calculation]

• Construction of circles



Maths Lab Activity 8 (group activity)

Suppose you have to mark circle on a playground to play a game.

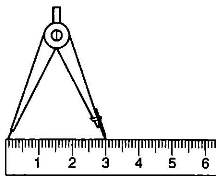


How will you mark out such a circle?

Get a piece of rope. Fix one end of it to a nail on the ground. Tie a marker to the other end of the rope. Now keeping the nail fixed, and pulling the rope tight, move the marker on the ground. The shape drawn by the marker is a circle.

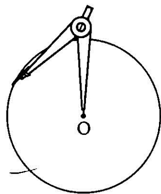
You can see that a circle is a path which is always the same distance from its centre.

We can draw circles using various objects, like a bangle, a rupee coin or a carrom coin, but these cannot be used if we have to draw a circle of a radius different from theirs. Thus to draw a circle of a given radius, we use a compass.



Let us draw a circle with a radius of 3 cm.

Fix the metal tip of the compass on the ruler at 0. Open out the compass to measure 3 cm on your ruler. The pencil tip should rest on 3.



Mark a point O in your notebook. Rest the metal tip of your compass on O. Now, with O as centre rotate the pencil tip on the paper to draw the circle.

Exercise 7.13

Construct circles with the following radii.

1) 4 cm	2) 2 cm 5 mm	3) 3 cm 8 mm	4) 4 cm 2 mm
5) 2.9 cm	6) 3.5 cm	7) 5.5 cm	8) 4.6 cm

• Interior and exterior of a circle

The shaded portion is referred to as the **interior** of the circle. A, O, B are points in the interior of the circle. The centre of the circle O is in the interior of the circle.

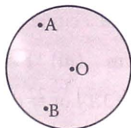


Fig. 1

The region outside the circle, for example the shaded portion of Fig. 2 is referred to as the **exterior** of the circle.

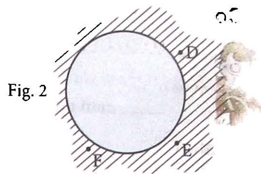


Fig. 2

D, E, F are points in the exterior of the circle.

X, Y, M, N are points **on** the circle (Fig. 3). These are points on the circumference of the circle.

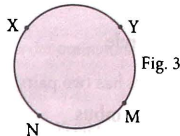


Fig. 3

O is the centre of a circle (Fig. 4). A is a point on the interior of the circle. C is a point in the exterior of the circle. B is on the circle. Measure OA, OB and OC.

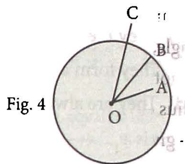


Fig. 4

You will find that

OA < OB and OC > OB

Thus,



the line segment, joining the centre to a point in the interior of a circle, is less than the radius.



the line segment joining the centre to a point in the exterior of a circle is greater than the radius.

Exercise 7.14

A circle has a radius of 5.5 cm. The distance between the centre O of the circle and points A, B, C, D are given.

Tick the correct answer.

(i) OA = 3 cm ; Location of A : (interior/exterior/on the circle)

(ii) OB = 5.5 cm ; Location of B : (interior/exterior/on the circle)

(iii) OC = 5 cm ; Location of C : (interior/exterior/on the circle)

(iv) OD = 5.9 cm ; Location of D : (interior/exterior/on the circle)

WORKSHEET
for formative assessment



MCQs

1. Which of these is a polygon?

   a) Square b) Circle c) Pyramid d) Cone

2. Which of these quadrilaterals has two pairs of parallel sides?

   a) Rectangle b) Rhombus c) Parallelogram d) All of these

3. Which of the following sentences best describes two parallel lines?

   a) They meet at exactly one point

   b) They meet at exactly two points.

   c) They form a right angle.

   d) They are always the same distance apart.

4. This is a: ⟷

   a) Line b) Line segement c) Ray d) Closed figure

5. A line segment whose end points lie on a circle is called a:

   a) Diameter b) Radius d) Arc d) Chord

Hots questions

1. What is the least number of sides a polygon can have?
2. A giant wheel in a fair had a diameter of 250 feet. What is the distance a person travels in one complete revolution?

Fun activity

1. Use body parts to show a right angle, angle less than a right angle and angle more than a right angle. Draw them in your note book using stick drawings.
2. Make closed geometrical shapes using

   a) 3 matchsticks c) 4 matchsticks

   b) 5 matchsticks d) 6 matchsticks

In each case measure the angles between adjacent matchsticks. What do you notice?

Summative Assessment 1
(Chapters 1 – 7)

1. Fill in the blanks.
   a) Roman numerals 'I' can be subtracted from _____ and _____ but not from _____
   b) The place value of _____ is always the same as its face value
   c) A prime number has exactly _____ factors.
   d) The _____ of a fraction and its reciprocal is 1.
   e) Decimal fractions have _____, _____, _____ as denominators.
2. Choose the correct option.
   a) One crore is equal to:
      i) ten lakhs ii) ten millions iii) 1,00,000 iv) Hundred thousands
   b) If a number A is a factor of a number B, then:
      i) B is also a factor of A ii) B is equal to A iii) B is a multiple of A iv) A is a multiple of B
   c) $\frac{4}{5} \div \frac{8}{3}$ is the same as:
      i) $\frac{4}{5} \times \frac{8}{3}$ ii) $\frac{5}{4} \times \frac{8}{3}$ iii) $\frac{4}{5} \times \frac{3}{8}$ iv) $\frac{8}{3} \div \frac{4}{5}$
   d) In a triangle, if one angle is a right angle, the sum of the other two angles is:
      i) less than 90° ii) more than 90° iii) equal to 90° iv) equal to 180°
   e) When a decimal number is divided by 10,000, the decimal point moves to the
      i) right by 4 places ii) right by 5 places iii) left by 4 places iv) left by 5 places
3. i) Write 32.68 in the expanded form
   ii) Convert 2.125 into a fraction
   iii) Add $2\frac{1}{12}, 3\frac{5}{6}, 4\frac{3}{8}$
   iv) Subtract $1\frac{1}{16}$ from $3\frac{5}{8}$
   v) Simplify $5 + [2\frac{1}{2} - \{\frac{1}{3} - (\frac{1}{4} + \frac{1}{6} - \frac{1}{12})\}]$
4. i) Find the greatest number which divides 101 and 77, leaving a remainder 5.
   ii) The product of two numbers is 900. If LCM is 60, find their HCF.
5. i) By how much is the smallest 8-digit numeral greater than the largest 7-digit numeral?
   ii) The Delhi-Dubai air ticket costs ₹ 7550. If 285 passengers bought the ticket, how much money did the airlines get from the passengers?
6. A rope 15m long was cut into pieces $\frac{1}{2}$ m long, to teach tying of knots to scouts. How many pieces were cut?
7. a) Round off 56538 to
      i) the nearest ten ii) the nearest thousand iii) the nearest ten thousand iv) the nearest lakh
   b) Find the cost of 15 litres of petrol at the rate of ₹ 23.85 per litre, if the bill is rounded off to the nearest rupee.
8. i) Ramu bought ₹ 25.30 worth of coffee and ₹ 38.45 worth of sugar from a shop. He gave a ₹ 100 note to the shopkeeper. How much money will the shopkeeper give back to him?
   ii) The cost of 25 chocolates is ₹ 138.75. What is the cost of 1 chocolate?
9. Construct a circle with radius = 3.5 cm. Mark a point A in the interior of the circle and a point B in the exterior of the circle.
10. Find the circumference of a circle with radius = 3.5 cm ($\pi = \frac{22}{7}$)

Area and Volume

8

rn

Learning Objectives



You will be able to:

- find the area of irregular shapes by using squared paper.
- find the area of a rectangle and square by using formulas.
- find the volume of a cube or a cuboid by using formulas.



Warm Up

- **Recall – Area**

Look at the two tables.
On which table can more things be kept? Why?
Table 2 can accommodate more things because it has a larger surface.

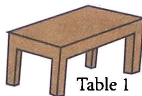


Table 1

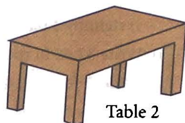


Table 2

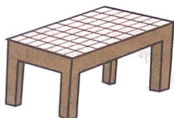
The amount of surface a closed figure covers is called its **area**.



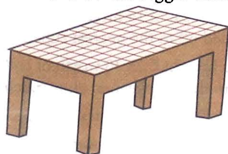


Maths Lab Activity 1

We can measure the area of a surface by covering it with some unit of area. Suppose we use a playing card as the unit of area. Take two tables like table 1 and 2 above. Cover their surfaces with playing cards. Count the number of playing cards in each case. What do you find? You will see that more playing cards are required to cover the surface of the bigger table, than the smaller table. So the bigger table has a larger area.



Number of cards covering the surface = __________

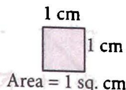


Number of cards covering the surface = __________

Just as we need a standard unit for measurement of length, we also need a standard unit for measurement of area.

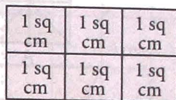
To measure small areas like a square or a rectangle drawn in your exercise book, we use a square of side 1 cm as the standard unit of area.

Here is a square of side 1 cm. We say that it has an area of **1 square centimetre.** We also write this as **1 sq. cm** or **1 cm²**.



Here is a figure covered by 6 such squares.

Therefore its area is 6 sq. cm.



Recall exercise

A. Find the area of shaded parts by counting squares. Assume each small square is 1 sq. cm.

1) Area = ____ sq. cm

2) Area = ____ sq. cm

3) Area = ____ sq. cm

4) Area = ____ sq. cm

5) Area = ____ sq. cm

6) Area = ____ sq. cm

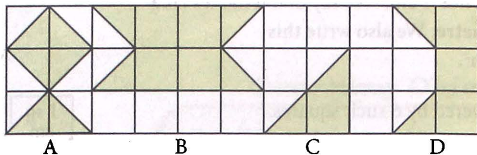
7) Area = ____ sq. cm

8) Area = ____ sq. cm

• Finding area when whole squares are not covered

It is easy to work out the area of shapes enclosing the squares completely.

What happens when a shape encloses some squares partly?



Here, we count one complete square for every two half squares enclosed.

So, the area of A is 3 sq. cm.

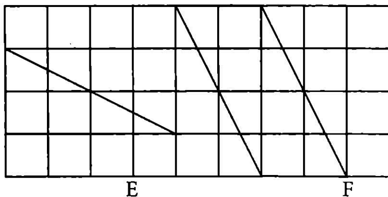
The area of B is 6 sq. cm.



The area of C is ___________

The area of D is ___________

Now look at these figures.



The figures enclose less than half of some squares and more than half of others.

To find the area we

(i) count all full squares enclosed.

(ii) when half a square or more is covered, count it as a whole square.

(iii) do not count less than half of a square.

Thus the area of E is 4 sq. cm.

The area of F is 8 sq. cm.

This method gives the approximate area.





Maths Lab Activity 2

Find the area of each of the following.

1

Area : ....

2

Area : ....

3

Area : ....

4

Area : ....

5

Area : ....

6

Area : ....

7

Area : ....

8

Area : ....

9

Area : ....

10

Area : ....

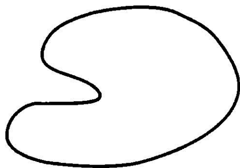
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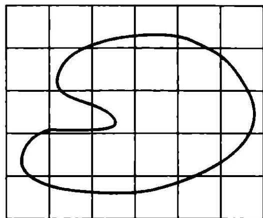
Area : ....

• Area of irregular shapes

You have found the areas of shapes whose sides are straight. Now let us find the areas of curved and irregular shapes.

How would you find the area of this shape?



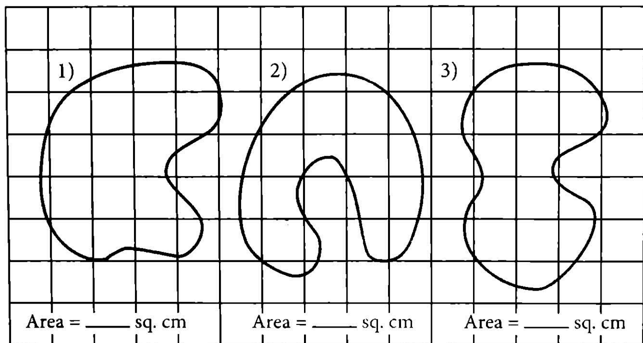


Place a square centimetre grid on the shape and count the number of squares within the curve. If a square has half or more of its area within the curve, count it as a full square. Do not count less than half of a square.

This shape has an area of.............. square centimetres.

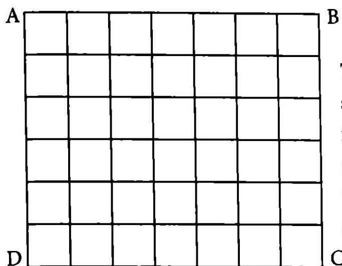
Exercise 8.1

Find the areas of these shapes:



• Area of rectangle and square





The rectangle ABCD has been divided into squares of side 1 cm. The area of each square is 1 sq. cm. Therefore the area of the rectangle = number of such squares in it.

The area of this rectangle is 42 sq. cm. Is this true? Count the units and check.

A quick way of calculating the area of a rectangle is:

- Count the square centimetres in a row: there are 7.
- Count the square centimetres in a column: there are 6.
- Multiply the two: $7 \times 6 = 42$.

The area of the rectangle is **42 sq. cm.**

Now we know that — Area of a rectangle = length × breadth

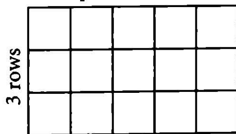
In a square length = breadth — ∴ Area of a square = side × side



Exercise 8.2

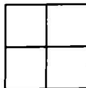
What is the area of each of these rectangles drawn on a centimetre grid?

1) 5 squares in a row



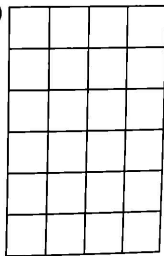
Area = 5 cm × 3 cm = 15 sq. cm

2)



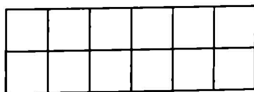
Area ________ sq. cm.

3)



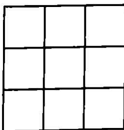
Area ________ sq. cm.

4)



Area ________ sq. cm.

5)



Area ________ sq. cm.

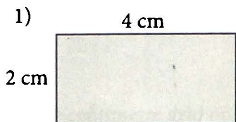
Example

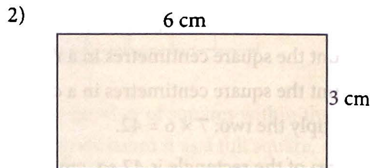
The length and breadth of a rectangle are 10 cm and 8 cm. Find its area.

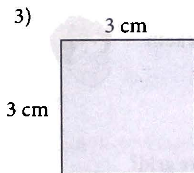
Length of the rectangle	=	10 cm
Breadth of the rectangle	=	8 cm
Area of the rectangle	=	length × breadth
	=	10 × 8 sq. cm
	=	80 sq. cm

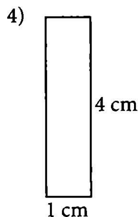
Exercise 8.3

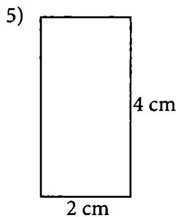
A. Find the areas of these rectangles.

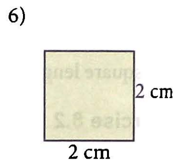
1)


2)


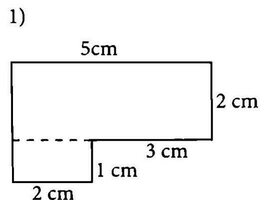
3)


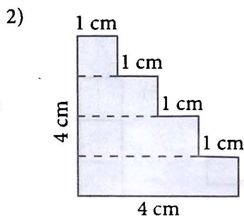
4)


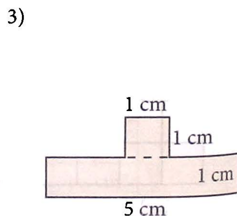
5)


6)


B. Find the areas of these figures, using the methods of determining area of rectangles and squares.

1)


2)


3)


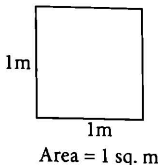
- **Larger areas**

You have learnt that areas with small surfaces are measured in square millimetres and square centimetres.

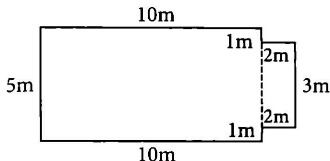
We use square metres to measure areas of large surfaces like walls, gardens, playing fields etc.

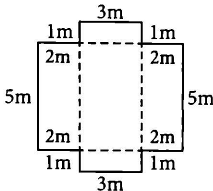
A square metre is a square of side 1m.

(The square has not been drawn to scale.)



Find the area and perimeter of the carpet and kitchen garden. The diagrams have been drawn smaller than they really are.





Area of the carpet = ...

Perimeter of the carpet = ...

Area of the kitchen garden = ...

Perimeter of the kitchen garden = ...

Example

The length of a rectangle is 1.5m and the breadth is 30 cm. Find the area.

Length of the rectangle	=	1.5 m = 150 cm
Breadth of the rectangle	=	30 cm
Area of the rectangle	=	150 × 30 sq. cm
	=	4500 sq. cm

Another way of doing this is:

Length of the rectangle	=	1.5 m
Breadth of the rectangle	=	30 cm = 0.3 m
Area of the rectangle	=	1.5 × 0.3 sq. m
	=	0.45 sq. m

Note that the **length and breadth are always expressed in the same unit.** If the given units are not the same, then first express them in the same unit and then find the area.

Example

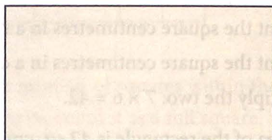
The length and breadth of a rectangle are 10 cm and 8 cm. Find its area.

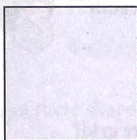
Length of the rectangle	=	10 cm
Breadth of the rectangle	=	8 cm
Area of the rectangle	=	length × breadth
	=	10 × 8 sq. cm
	=	80 sq. cm

Exercise 8.3

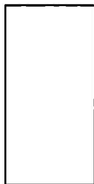
A. Find the areas of these rectangles.

1)


2)


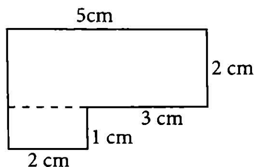
3)


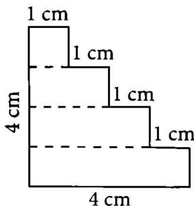
4)

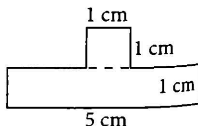

5)


6)

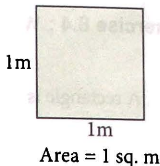

B. Find the areas of these figures, using the methods of determining area of rectangles and squares.

1)


2)


3)


• Larger areas



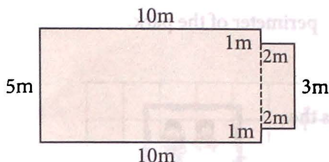
You have learnt that areas with small surfaces are measured in square millimetres and square centimetres.

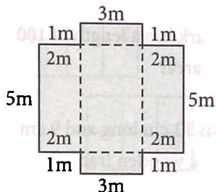
We use square metres to measure areas of large surfaces like walls, gardens, playing fields etc.

A square metre is a square of side 1m.

(The square has not been drawn to scale.)

Find the area and perimeter of the carpet and kitchen garden. The diagrams have been drawn smaller than they really are.





Area of the carpet = ...

Perimeter of the carpet = ...

Area of the kitchen garden = ...

Perimeter of the kitchen garden = ...

Example

The length of a rectangle is 1.5m and the breadth is 30 cm. Find the area.

Length of the rectangle	=	1.5 m = 150 cm
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Area of the rectangle	=	150 × 30 sq. cm
	=	4500 sq. cm

Another way of doing this is:

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Area of the rectangle	=	1.5 × 0.3 sq. m
	=	0.45 sq. m

Note that the **length and breadth are always expressed in the same unit.** If the given units are not the same, then first express them in the same unit and then find the area.

Exercise 8.4 : Word problems



1) A rectangle is 4 cm long and 3.5 cm broad. What is the area of the rectangle?

2) Find the area of a square whose side is 2.5 cm in length.

3) Rohit and Kamal are playing in a room which is 5.5 metres long and 3.5 metres in breadth. What is the area of the room?

4) A square park has a length of 100 m. What is the perimeter of the park? What is its area?

5) A picture is 12 cm long and 9 cm broad? What is the length of the wooden frame needed for framing the wall piece? What is the area of the glass required to cover the picture in the frame?



6) What is the area of a square park whose side is 150 metres? Find the total cost of planting grass in it at ₹ 10 per square metre.

7) What is the area of a rectangular garden whose length is 50 m and breadth 30.5 m? If the cost of manuring the garden is ₹ 6.50 per sq. m, find the total cost of manuring the garden.

8) A hall is paved with 1 square metre tiles. If the length and breadth of the hall are 15m and 10m, how many tiles are needed? If each tile costs ₹ 15.50 find the cost of tiling.

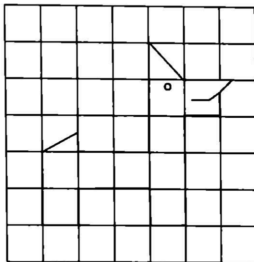
9) The base of a rectangular tank is 21.5 m long and 10 m broad. Find the cost of painting the base of the tank if the cost of painting is ₹ 2.50 per sq m.

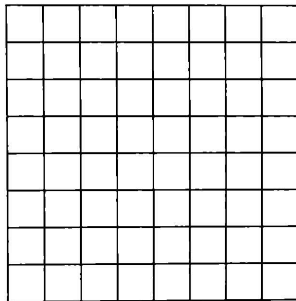
10) A hall measures 16 m by 12 m. How many square tiles of side 4 m will be required to pave its floor?

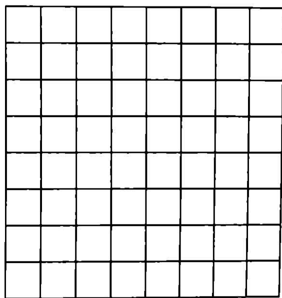


Maths Lab Activity 3

Draw any two figures which have an area of 10 sq. cm each.
An example has been done for you.
Remember not to count squares less than half.

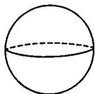


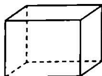




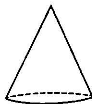
- ## Volumes

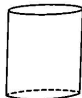
What is the shape of each object?











Are these objects solid or plane?

Do they occupy space?

Yes, each of these solids occupies space.

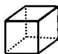
The measure of the amount of space a solid occupies is called the **volume** of the solid



• Volume of solid shapes

What is the characteristic feature of a cube?

A cube is a rectangular solid whose length = breadth = height.

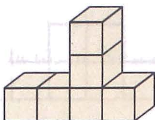


Jyoti makes each of the following shapes using 6 unit cubes.

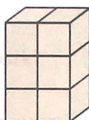
1.



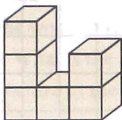
2.



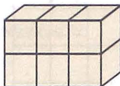
3.



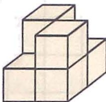
4.



5.



6.



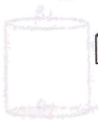
Since each shape is made up of 6 unit cubes, the volume of each shape is 6 unit cubes or 6 cubic units.

Can you make more such shapes using 6 unit cubes?

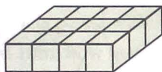
Exercise 8.5

The following shapes are also made of unit cubes.

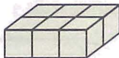
Find the volume of each shape.



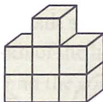
1.



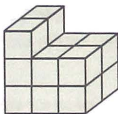
2.



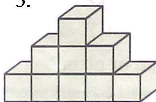
3.



4.

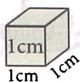


5.



Which shape has the largest volume? ______ . Which shape has the least volume? ______ .

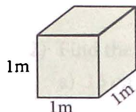
Units of volume



Here is a small tin box with each of the edges 1 cm long. The space enclosed is called the volume of the box. The volume of this box is **1 cubic centimetre.**



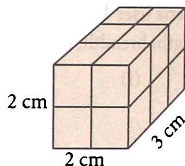
This shape is made of 4 unit cubes. Each cube has a volume of 1 cubic centimetre. Therefore the volume of this shape is **4 cubic centimetre.**



Here is a large box with each edge 1 m long.
The volume of this box is **1 cubic metre.**

Volume of a cuboid

Here is a cuboid whose
length = 2 cm, breadth = 3 cm, height = 2 cm
Count the number of unit cubes to find its volume.
Its volume is 12 cubic cm.



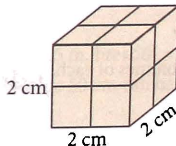
Now find length × breadth × height of the cuboid.
length × breadth × height = 2 cm × 3 cm × 2 cm = 12 cubic cm
But this is the same as its volume.
Therefore

Volume of cuboid = length × breadth × height



Volume of a cube

In a cube length = breadth = height
Therefore volume of cube = side × side × side





Volume of cube = side × side × side

Volume of the cube shown = 2 cm × 2 cm × 2 cm
= 8 cubic cm

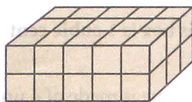
Example : Here we have made a cuboid using 30 cubes



length = 5 cm

breadth = 3 cm

height = 2 cm



The volume of the cuboid

= length × breadth × height

= 5 cm × 3 cm × 2 cm = 30 cubic cm

Exercise 8.6

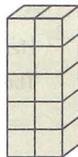
1. Rahul makes a cuboid of

   length = 2 cm

   breadth = 1 cm

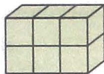
   height = 5 cm

   What is its volume? ___________



2. Neena uses 1 cm cubes to build the following cuboids. Help her calculate the length, breadth, height and volume of each cuboid.

(i)



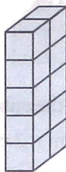
Length = ______ cm

breadth = ______ cm

height = ______ cm

volume = ______ cubic cm

(ii)



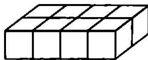
length = ______ cm

breadth = ______ cm

height = ______ cm

volume = ______ cubic cm

(iii)



length = ______ cm

breadth = ______ cm

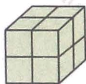
height = ______ cm

volume = ______ cubic cm

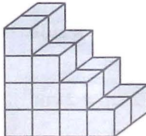
Exercise 8.7

1) Find the volumes of each. [cube] denotes 1 cubic cm.

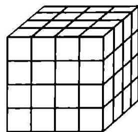
A



B

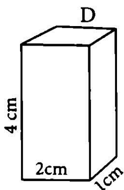


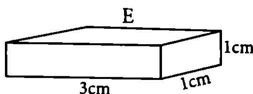
C

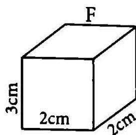




CD activity
12
Builder Bob







2) Find the volume of cubes whose edges are as follows.

a) 15 cm	b) 6.5 m	c) 20 cm	d) 12.5 m
e) 15.1 cm	f) 2.7 m	g) 30 cm	h) 3.2 m

3) Find the volume of cuboids with the following dimensions.

a) length = 24 cm breadth = 10 cm height = 12 cm

b) length = 3.6 cm breadth = 2.4 cm height = 2 cm

c) $\ell = 2.5$ cm, $b = 1.5$ cm, $h = 2$ cm

d) $\ell = 2.8$ cm, $b = 1.7$ cm, $h = 2$ cm

4) A swimming tank is 20 m long, 15 m broad and 2 m deep. What is the volume of the tank?

5) A room is 7 m long, 5 m broad and 8 m high. What is the volume of the room?

6) A box is 18.2 cm long, 10.5 cm broad and 2 cm thick. What is the volume of the box?

7) A dictionary measures 25 cm in length, 18 cm in breadth and 7 cm in thickness. What is the volume of the dictionary?

8) A block of wood in the shape of a cuboid has length = 2.5 m, breadth = 1.5 m and height = 2 m. How many cubical blocks, each of edge 50 cm can be cut from it?

9) Find the volume of earth dug out from a cubical pit whose edge is 2.4 m.

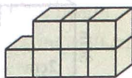
10) A metal cuboid is of dimensions 50 cm, 10 cm and 20 cm. If the weight of 1 cubic cm of the metal is 8 grams, find the weight of the metal cuboid in kilograms.

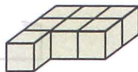




Maths Lab Activity 4 (model making)

A. Try and get 7 small wooden/plastic dice. Arrange them so as to get different figures. Two arrangements are given below.



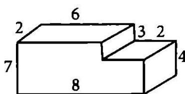


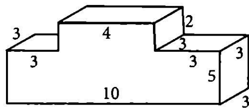
What is the volume of each figure here?

Compute the volume of each of the figures you make.

What do you observe?

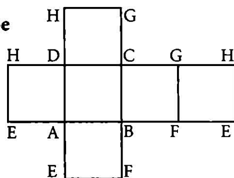
B. Look at the solid figures given here. Find their volumes. The measurements are in centimeters

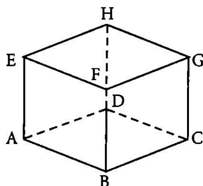




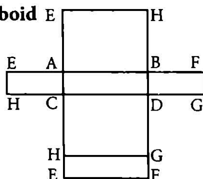
C. Here are some NETS. Use them to make the following (model making).

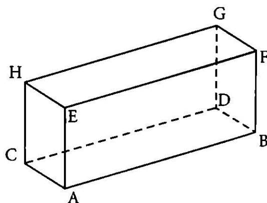
1) Cube



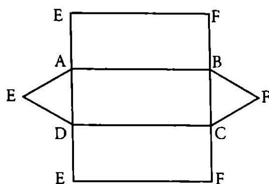


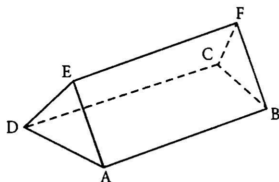
2) Cuboid



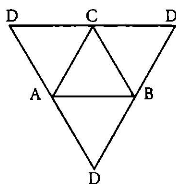


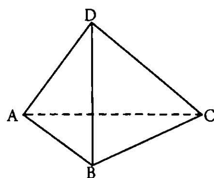
3) Triangular prism



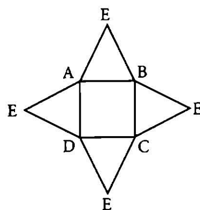


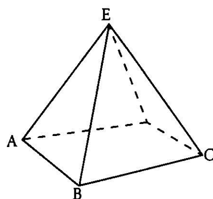
4) Regular tetrahedron



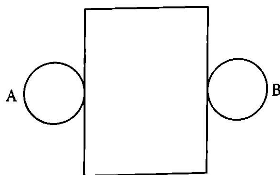


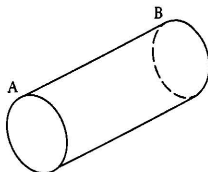
5) Square based pyramid





6) Cylinder







WORKSHEET
for formative assessment

MCQs

1. The breadth of a rectangle is increased by 2 units. Its perimeter is now increased by

   a) 2 units   b) 4 units   c) 8 units   d) 16 units

2. The area of a square is equal to the area of a rectangle of ℓ = 8 cm and b = 2 cm. What is the side of the square?

   a) 6 cm   b) 4 cm   c) 3 cm   d) 8 cm

3. How many small cubes of side 2 cm can be put in a cubical box of side 6 cm?

   a) 9   b) 12   c) 27   d) 6

4. A cuboid measures 24 m × 12 m × 10 m. How many cubes of side 3 m can fit in the box?

   a) 9   b) 16   c) 15   d) 24

5. Area of a square is:

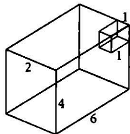
   a) product of all sides   b) sum of all sides   c) side × side   d) 2 × side

Hots questions

1. Fill in the blanks, in the table below.

	Figure	Length	Breadth	Area
1)	Square	....	....	25 sq. cm
2)	Rectangle	10 cm	....	30 sq. cm
3)	Square	1.5 m	....	....
4)	Rectangle	....	11 m	82.5 sq. cm
5)	Square	....	....	6.25 sq. cm

2. Priya builds a cuboid of dimension 6 cm × 4 cm × 2 cm. A corner of the cuboid breaks in the form of a cube of dimension 1 cm × 1cm × 1cm. What is the volume of the remaining portion?



3. A board has an area of 49 square centimetres. Find its perimeter.

Fun activity

1. **Find out the length, breadth and depth of an Olympic swimming pool in metres. Work out the following.**

   a) **If you swam 35 laps, what distance did you swim?**

   b) **How many laps do swimmers have to swim in an 800 metre race?**

   c) **How many cubic metres of water does the pool hold?**

Percentages

9

Learning Objectives



You will be able to:

- convert between percentages, fractions and decimals.
- find percentage of a number.

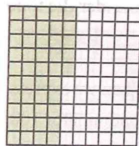
Warm Up





Maths Lab Activity 1

Make a 10×10 grid on a sheet of paper and shade 45 squares as in the picture.



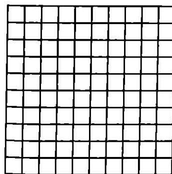
Out of the 100 small squares here 45 are shaded.
The shaded part comprises 45 out of 100 or **45 per cent** of the whole.

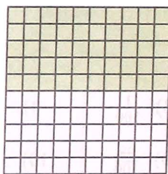
Therefore, one small square represents **1 out of a 100** or **1 per cent** of the whole.

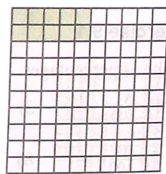
The term **per cent** comes from two Latin words **per centum** which means "out of a 100".

What per cent is unshaded in your grid?

1. What per cent is shaded and what per cent is unshaded in the following?



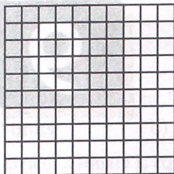
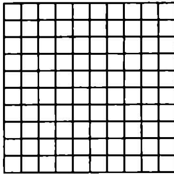
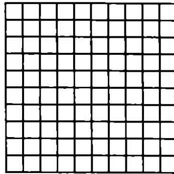




Shaded : ______ ______ ______

Unshaded : ______ ______ ______

2. Take three 10 × 10 grids. Shade (i) 70 per cent, (ii) 33 per cent, and (iii) 92 per cent in them.

What per cent of each is unshaded?

To save ourselves from writing per cent each time, we can use the symbol which denotes it : %

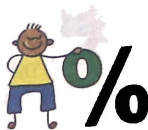
Therefore

70 per cent = 70%

33 per cent = 33%

92 per cent = 92%

The sign helps us to remember "out of 100" because its 3 parts are like a 1 and two 0s :



• Expressing fractions as percentages

Consider the following equivalent fractions.

$\frac{1}{2} = \frac{50}{100}$ $\frac{2}{5} = \frac{40}{100}$

When we express fractions as equivalent fractions having the denominator 100, we are expressing them in **hundredths.**

Per cent is another way of expressing fractions in hundredths.

$\frac{1}{2} = \frac{50}{100}$ or $\frac{1}{2}$ is 50 per cent, written as 50%.

$\frac{2}{5} = \frac{40}{100}$ or $\frac{2}{5}$ is 40 per cent, written as 40%.

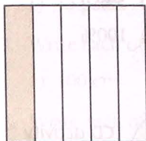
Exercise 9.1

Write as percentages.

1) $\frac{33}{100}$	2) $\frac{25}{100}$	3) $\frac{1}{100}$	4) $\frac{9}{100}$	5) $\frac{45}{100}$	6) $\frac{11}{100}$
7) $\frac{19}{100}$	8) $\frac{89}{100}$	9) $\frac{98}{100}$	10) $\frac{99}{100}$	11) $\frac{2}{5}$	12) $\frac{3}{20}$
13) $\frac{36}{50}$	14) $\frac{1}{4}$	15) $\frac{1}{10}$	16) $\frac{4}{25}$	17) $\frac{3}{5}$	18) $\frac{3}{4}$

Here is another way to convert fractions into percentages.

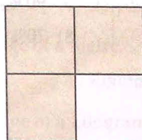
Consider $\frac{1}{5}$



$\frac{1}{5} = \frac{1}{5} \times 100\%$

$= \frac{100}{5}\% = 20\%$

Consider $\frac{3}{4}$



$\frac{3}{4} = \frac{3}{4} \times 100\%$

$= \frac{300}{4}\% = 75\%$

Therefore, **to convert fractions into percentages, multiply by 100.**

Exercise 9.2

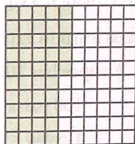
Change these fractions to percentages.

1) $\frac{1}{10}$	2) $\frac{3}{5}$	3) $\frac{1}{20}$	4) $\frac{4}{5}$	5) $\frac{7}{20}$
6) $\frac{11}{20}$	7) $\frac{7}{50}$	8) $\frac{3}{25}$	9) $\frac{12}{15}$	10) $\frac{21}{25}$
11) $\frac{19}{50}$	12) $\frac{14}{25}$	13) $\frac{6}{10}$	14) $1\frac{3}{10}$	15) $5\frac{2}{5}$

Changing percentages to fractions

$45\% = \frac{45}{100}$

$= \frac{9}{20}$ (Dividing numerator and denominator by 5)



Exercise 9.3

Change these percentages into fractions.

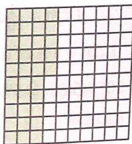
1) 25%	2) 5%	3) 70%	4) 55%	5) 64%
6) 79%	7) 11%	8) 2%	9) 33%	10) 37%

Changing percentages to decimals

$35\% = \frac{35}{100}$ and $\frac{35}{100} = 0.35$

$\therefore 35\% = 0.35$

To convert percentages to decimals, divide by 100.



Exercise 9.4

Change the following percentages to decimals.

1) 6%	2) 32%	3) 90%	4) 1%	5) 3%
6) 65%	7) 99%	8) 70%	9) 24%	10) 100%

Changing decimals to percentages

Consider 0.15

$0.15 = \frac{15}{100}$ and $\frac{15}{100} = \frac{15}{100} \times 100\% = \frac{1500}{100}\% = 15\%$



$\therefore$ 0.15 = 15%

This can also be obtained by **multiplying the decimal by 100.**

Exercise 9.5

Express the decimals as percentages.

1) 0.48	2) 0.80	3) 0.03	4) 0.35	5) 0.52
6) 0.91	7) 0.01	8) 0.11	9) 0.19	10) 0.1

• Money and metric measures as percentages

Percentage is often used in connection with money. You must have noticed this in advertisements e.g., '10% off on sarees' or '15% off on shoes'.

Let us learn to express paisa as percentages. How many paisa are there in a rupee?

1) A rupee has 100 paisa or we can say

100 paisa = 1 rupee

1 paisa = $\frac{1}{100}$ of a rupee

1 paisa = 1% of a rupee

$\therefore$ 2 paisa = 2% of a rupee

Let us now learn to convert metric measures into percentages.

2) Recall 100 cm = 1 m

$\therefore$ 1 cm = $\frac{1}{100}$ of a metre

1 cm = 1% of a metre

$\therefore$ 5 cm = 5% of a metre

3) 1000 g = 1 kg

1 g = $\frac{1}{1000}$ of a kg = $\frac{0.1}{100}$ of a kg

1 g = 0.1% of a kg

$\therefore$ 2 g = 0.2% of a kg

and 10 g = ___ % of a kg

Similarly since 1000 mℓ = 1 ℓ, 1 mℓ = 0.1% of a ℓ, 12 mℓ = 1.2% of a ℓ

Exercise 9.6

A. Write each of the following as a percentage of a rupee.

1) 40 paisa 2) 19 paisa 3) 8 paisa 4) 23 paisa 5) 62 paisa

B. Write each of the following as a percentage of a metre.

1) 100 cm 2) 90 cm 3) 80 cm 4) 10 cm 5) 1 cm

C. Write each of the following as a percentage of a kilogram.

1) 90 g 2) 900 g 3) 9 g 4) 2 g 5) 1000 g

Finding percentage of a number

Study the following examples carefully.

Example 1 : Rohit scored 25% in English. The marks were out of 60. How many marks did he score?

Rohit scored 25% of 60.

$25\% \text{ of } 60 = \frac{\cancel{25}^{1}}{\cancel{100}_{4}} \times 60 = \frac{60}{4} = 15$

So Rohit scored 15 out of 60 in English.

Example 2 : Peter scored 75% marks in History. The test was of 40 marks. How many marks did Peter score?

Peter scored 75% of 40.

$75\% \text{ of } 40 = \frac{\cancel{75}^{3}}{\cancel{100}_{4}} \times 40 = \frac{120}{4} = 30$

Thus Peter scored 30 out of 40 in History.

Example 3 : Anju scored the highest marks in Geography. She scored 39 out of 60. What percentage is this?

Anju scored 39 out of 60 or

$\frac{39}{60} = \frac{39}{60} \times 100\% = \frac{3900}{60}\% = \frac{390}{6}\%$ (dividing numerator and denominator by 10)

$= 65\%$

Exercise 9.7

A. Find

1) 5% of 20
2) 10% of 80
3) 8% of 64
4) 3% of 300
5) 25% of 500
6) 12% of 1000
7) 30% of 480
8) 40% of 80
9) 64% of 6000
10) 150% of 100

B. What per cent is

1) 12 of 60	2) 20 of 80	3) 24 of 72
4) 7.5 of 30	5) $2\frac{1}{2}$ of 10	6) 75 of 300

C. Word problems

1) Ramesh gets a monthly salary of ₹ 3500. He pays 10% of it as rent. What is the monthly rent he pays?

2) Rajesh gets 16 out of 25 in his monthly test in English. Express his marks in percentage.

3) A school worked 220 days in a year. Gopal was absent for 22 days. Find his attendance percentage for the year.

4) 30% of the pupils in Class V are girls. If the strength of the class is 50, find the number of girls and the number of boys in the class.

5) The strength of a school is 750. 60% of them attended a film show arranged by the school. How many did not attend the show?

6) In a class of 50 boys, 10 play hockey, 15 play football and the rest do not play any game. What percentage of the students play hockey or football? What percentage do not play any game?

7) Lakshman Lal owned property worth ₹ 60,000. He gave 75% of his property to his wife, 15% to his son and the remaining to charity. What amounts were received by his wife and son?

8) Out of a distance of 1500 kilometres, 60% was travelled by bus and the rest by train. Find the distances travelled by bus and by train.

9) Neha got 68% in a Hindi test. How many marks out of 25 is this? How many marks out of 25 did she get in English if her percentage of marks was 72?

10) Asha's examination marks were : Maths $\frac{18}{25}$, English $\frac{12}{15}$, Hindi $\frac{18}{20}$. Change the results to percentages and arrange them in ascending order.

Life Skill : Applications

Water is the most important liquid on earth.

A few percentage problems on water are given below.



1) The human body consists of $\frac{2}{3}$ water.

   a) What percentage is this?

   b) How much water will be there in a person weighing 150 kilograms?



2) Earth's surface consists of 75% water.

   a) What fraction is this?

   b) What percentage of the earth's surface is land?



3) The oceans of the world consist of water and some dissolved minerals in it. If the minerals form $3\frac{1}{2}$ %, what per cent is water?

4) Human blood consists of 90% water.

   a) An adult has nearly 6 litres of blood. How much water does this contain?

   b) A child has nearly 3 litres of blood. How much water does this contain?

5) When water freezes, its volume increases by about 9%. If 500 litres of water is frozen, then

   a) how much does the volume increase?

   b) what is the volume of ice?



6) Boiled potato contains 80% water. What fraction is this?



7) $\frac{3}{4}$ of an egg's volume is water. What per cent is this?

WORKSHEET
for formative assessment



MCQs

1. When we change $\frac{1}{4}$ to a per cent, we get

   a) $\frac{1}{4}$%   b) 40%   c) 25%   d) 2.5%

2. When we change 0.002 to a per cent , we get

   a) 2%   b) 0.2%   c) 20%   d) 200%

3. When we change 7.3 to a per cent , we get

   a) 73%   b) 7.3%   c) 7300%   d) 730%

4. When we change $\frac{9}{2}$ to a per cent , we get

   a) 4.5%   b) 450%   c) 92%   d) 45%

Hots questions

1. My height was 150 cm last year. This year I am 5% taller. What is my height now?
2. 75% of 400 is the same as what per cent of 150?
3. Shyam had 30% of his money left after spending ₹ 280. How much did he have at first?
4. If 5% of a number is 16, what is 50% of the number?

Fun activity–Life skill

You want to buy an enclyclopedia set.

Monthly purchase plan
₹100 per month
for 3 years

1. How much will the set cost if you use the store's monthly payment plan?
2. How much more than the cash price do you have to pay to buy the set on the monthly payment plan?
3. How much more in percentage terms do you have to pay?



Money

10

Learning Objectives



You will be able to:

- find the profit/loss per cent, when CP and SP are given.
- find SP when the profit/loss per cent is given.
- find CP when SP, profit/loss per cent is given.
- Use the formulas: A = P + I and I = (PTR/100) to find the amount and simple interest, given the other variables.
- interpret and check a bill.

Warm Up



• Recall

The unit of money in our country is the **rupee.**

1 rupee = 100 paise

1 rupee is written as ₹ 1 or ₹ 1.00   5 rupees is written as ₹ 5 or ₹ 5.00

We separate the rupees and the paise by a decimal point.

₹ 17.38 means 17 rupees and 38 paise.

₹ 15.05 means 15 rupees and 5 paise.

To convert rupees into paise, we **multiply the number of rupees by 100.**

For example, 16 rupees = 1600 paise.

To convert rupees and paise into paise, simply **remove the decimal point to get the equivalent in paise.**

For example, ₹ 5.17 = 517 paise.

To convert paise into rupees, **put a decimal point 2 places from the right.**

For example, 858 paise = ₹ 8.58

98 paise = ₹ 0.98

3 paise = ₹ 0.03

Now addition, subtraction, multiplication and division in money can be done as learnt in decimals.

Example 1 : Add ₹ 58.32, ₹ 9.03, ₹ 0.08

```
     58.32
      9.03
 +    0.08
 ---------
 ₹   67.43
 ---------
```

Answer : ₹ 67.43

Example 2 : Find the difference between ₹ 80 and ₹ 17.39

```
   80.00
 - 17.39
 -------
 ₹ 62.61
 -------
```

Answer : ₹ 62.61

Example 3 : The cost of 1 table is ₹ 175.75. Find the cost of 18 tables.

```
₹   175.75
   ×    18
----------
₹  1406.00
   1757.50
----------
₹  3163.50
----------
```

Answer : ₹ 3163.50

Example 4 : If 9 trouser lengths cost ₹ 758.52, find the cost of 1 trouser length.

```
     84.28
   -------
 9 )758.52
    72
    --
     38
     36
     --
      25
      18
      --
       72
       72
       --
        0
```

Answer : ₹ 84.28

Example 5: Complete the following.

The cost of 13 chocolates is ₹ 48.75. Find the cost of 10 chocolates.

The cost of 1 chocolate = cost of 13 chocolates ÷ 13 =

Cost of 10 chocolates = cost of 1 chocolate × 10 =

Exercise 10.1

A. Add

1) ₹ 78.32, ₹ 9.89, ₹ 178.03, ₹ 34.56
2) ₹ 782.09, ₹ 59.74, ₹ 69.70
3) ₹ 1001.01, ₹ 4.90, ₹ 34.70

B. Do the following subtraction sums.

1) ₹ 900.81 – ₹ 79.98
2) ₹ 400.00 – ₹ 199.34
3) ₹ 341.11 – ₹ 198.78
4) ₹ 74.03 – ₹ 29.98

C. Work out the following multiplication sums.

1) ₹ 92.87 × 7
2) ₹ 103.92 × 8
3) ₹ 246.24 × 13
4) ₹ 403.82 × 25
5) ₹ 587.18 × 31
6) ₹ 678.38 × 45

D. Work out the following division sums.

1) ₹ 789.30 ÷ 9
2) ₹ 742.61 ÷ 11
3) ₹ 148.35 ÷ 15
4) ₹ 489.68 ÷ 8
5) ₹ 428.64 ÷ 12
6) ₹ 487.62 ÷ 18

E. Word problems

1. The cost of a pair of sunglasses is ₹ 145.50. Find the cost of 44 such sunglasses.
2. The school uniform shop bought 45 m of cloth costing ₹ 55.55 per metre. Find the amount spent.
3. The annual salary of a worker in a factory is ₹ 13611.36. Find his monthly salary.
4. 26 kg of cooking oil costs ₹ 1359.80. What does 1 kg oil cost?
5. A car travels 448 km in ₹ 224 worth of petrol. How far does it go in ₹ 1?
6. ₹ 110.50 worth of cloth is required to stitch 1 shirt. Find the cost of cloth required to stitch 25 shirts.
7. A fountain pen can be filled 25 times from a small bottle of ink costing ₹ 6.25. Find the cost of the ink that can be filled in the fountain pen.
8. The cost of 1 kg of potatoes is ₹ 8. Find the cost of 36 kg 750 g of potatoes.
9. Anant bought the following from a post office.

   12 aerogrammes at ₹ 7.50 each; 12 inlands at 75 p each; 15 postcards at 25 p each
   Find the amount of money spent by him. If he gave ₹ 150 to the man at the counter, how much money was returned to him?
10. The cost of 5 shirts is ₹ 763.75. Find the cost of (i) 1 shirt (ii) 12 shirts.

• Profit and loss

Profit and loss are terms that are mainly used in business deals. As you know, businessmen buy things at a lower price (called the **cost price**) from places where they are cheaper and sell them at a higher price (called the **selling price**). Thus they **gain** money or **profit** from the deal. But if due to certain circumstances the selling price is lower than the cost price then they would incur a loss.

This concept of profit, loss, cost price and selling price will be clear from the following examples :

Example 1 : Surjeet runs a furniture shop. He buys and sells sofa sets.

He buys a sofa for ₹ 4000 and a few days later sells it for ₹ 5000.

The **cost price** (C.P.) of the sofa = ₹ 4000

As he sells it for ₹ 5000,

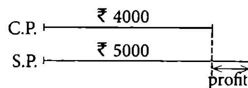
the **selling price** (S.P.) of the sofa = ₹ 5000

Since the selling price is higher than the cost price, there is a **gain** or a **profit.**

We can say, Profit or Gain = selling price – cost price

= S.P. – C.P. = ₹ 5000 – ₹ 4000

= ₹ 1000



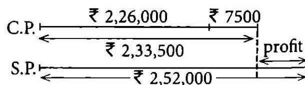
∴ Profit = ₹ 1000

Surjeet gained or made a profit of ₹ 1000 in buying and selling the sofa.

Example 2 : Mr Sharma bought an old house for ₹ 2,26,000. He sold it for ₹ 2,52,000 after spending ₹ 7500 on repairs.

Look at the diagram.

Cost price of the house	= ₹ 2,26,000
Amount spent on repairs	= ₹ 7500
Total cost	= ₹ 2,33,500



Selling price = ₹ 2,52,000

S.P. – C.P. = ₹ 2,52,000 – ₹ 2,33,500

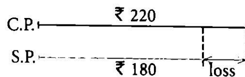
= ₹ 18,500

Mr Sharma made a profit of ₹ 18,500.

Note that any additional expenses such as repairs or freight are called **overhead charges.** They are a part of the cost price of the goods.

Example 3 : Suresh buys a basket of mangoes at ₹ 220. He sells the basket at ₹ 180. Find his gain or loss.

Look at the diagram.



C.P. of mangoes = ₹ 220

He sells the basket at ₹ 180

∴ S.P. of mangoes = ₹ 180

Cost Price (C.P.) is more than the selling price (S.P.)

∴ C.P. – S.P. = ₹ 220 – ₹ 180 = ₹ 40

Suresh incurs a loss of ₹ 40.

Remember, **if cost price is more than the selling price, a loss is incurred.**

Hence we can say,

Profit = selling price – cost price

Loss = cost price – selling price

Example 4 : A dealer of electronic goods bought a transistor for ₹ 475 and sold it for ₹ 510. Find his profit.

Cost price of the transistor = ₹ 475

Selling price of the transistor = ₹ 510

Profit = selling price – cost price

= ₹ 510 – ₹ 475 = ₹ 35

Example 5 : A dealer bought a chair for ₹ 90 and spent ₹ 10 on labour charges to bring it to his shop. He sold it for ₹ 75. Find his loss.

Cost price of the chair = ₹ 90 + ₹ 10

= ₹ 100

Selling price of the chair = ₹ 75

Loss = cost price – selling price

= ₹ 100 – ₹ 75 = ₹ 25

Example 6 : A dealer bought a saree for ₹ 286 and sold it at a profit of ₹ 75. Find the selling price of the saree.

Cost price of the saree = ₹ 286

Profit = ₹ 75

Selling price = cost price + profit

= ₹ 286 + ₹ 75 = ₹ 361

Selling price of the saree = ₹ 361

Example 7 : A dealer bought a chair for ₹ 428 and sold it at a loss of ₹ 68. Find the selling price.

Cost price of the chair = ______

Loss = ______

Selling price = cost price – loss

= ______ – ______

= ______

Example 8 : A general merchant sold a tin of ghee for ₹ 158 making a profit of ₹ 27. Find the cost price.

Selling price = ______

Profit = ______

Cost price = selling price – profit

= ______ – ______

= ______

Example 9 : A shoemaker sold a pair of shoes for ₹ 144 incurring a loss of ₹ 17. Find the cost price.

Selling price = ______

Loss = ______

Cost price = selling price + loss

= ______ + ______

= ______

Exercise 10.2

A. Find the profit or loss.

1)	C.P. = ₹ 144	S.P. = ₹ 168	
2)	C.P. = ₹ 172	S.P. = ₹ 156	
3)	C.P. = ₹ 249	S.P. = ₹ 245	overhead charges = ₹ 15
4)	C.P. = ₹ 160	S.P. = ₹ 160	overhead charges = ₹ 5
5)	C.P. = ₹ 59	S.P. = ₹ 38	overhead charges = ₹ 10

B. Find the selling price.

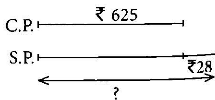
1)	C.P. = ₹ 145		profit = ₹ 15
2)	C.P. = ₹ 244		loss = ₹ 14
3)	C.P. = ₹ 316		profit = ₹ 19
4)	C.P. = ₹ 415	overhead charges = ₹ 85	profit = ₹ 21
5)	C.P. = ₹ 528	overhead charges = ₹ 72	loss = ₹ 12

C. Find the cost price.

1)	S.P. = ₹ 105	loss = ₹ 12
2)	S.P. = ₹ 218	profit = ₹ 12
3)	S.P. = ₹ 176	loss = ₹ 14
4)	S.P. = ₹ 210	profit = ₹ 15
5)	S.P. = ₹ 316	loss = ₹ 20

D. Word problems : (draw diagrams wherever you are not sure; the first has been drawn for you)

1) A cycle was bought for ₹ 625 and sold at a gain of ₹ 28. Find the selling price of the cycle.



2) A table was bought for ₹ 320 and sold at a loss of ₹ 18. Find the selling price of the table.

3) Mohan bought a house for ₹ 75,000, spent ₹ 1500 on repairs, and sold it for ₹ 82,000. What is his profit?

4) By selling a transistor for ₹ 515, Gopal made a profit of ₹ 23. Find the cost of the transistor.

5) By selling a refrigerator for ₹ 5875, Mrs Thapa lost ₹ 225. Find the price Mrs Thapa had paid for her refrigerator.

6) A radio is bought at ₹ 450 and sold at a profit of ₹ 35 after spending ₹ 15 on repairs. Find the selling price.

7) A cow is sold at a profit of ₹ 350. If the selling price is ₹ 975 and ₹ 75 was spent on looking after the cow, find the price at which it was bought.

Profit and loss as percentages

Profit and loss are often expressed as a percentage of the cost price.

Example 1 : A radio is bought for ₹ 450 and sold for ₹ 495. Find the percentage of profit.

Cost price of the radio = ₹ 450
Selling price of the radio = ₹ 495
Profit = ₹ 45

Percentage of profit = $\frac{\text{profit}}{\text{cost price}} \times 100$

$= \frac{45}{450} \times 100\% = 10\%$

Example 2 : A scooter was bought for ₹ 3800 and sold for ₹ 3420. Find the percentage of loss.

Cost price of the scooter = ₹ 3800
Selling price of the scooter = ₹ 3420
Loss = ₹ 380

Percentage of loss = $\frac{\text{loss}}{\text{cost price}} \times 100$

$= \frac{380}{3800} \times 100\% = 10\%$

Example 3 : Find the selling price if cost price = ₹ 50 and profit = 10%

C.P. = ₹ 50
Profit = 10% of ₹ 50

$= \frac{10}{100} \times$ ₹ 50 = ₹ 5

Therefore S.P. = ₹ 50 + ₹ 5
= ₹ 55

Example 4 : Find the cost price if selling price = ₹ 180 and loss = 10%

Let C.P. be ₹ 100
Loss = 10% of ₹ 100 = ₹ 10

Therefore S.P. = 100 – 10 = ₹ 90

When S.P. is ₹ 90, C.P. is ₹ 100
When S.P. is ₹ 1, C.P. is ₹ $\frac{100}{90}$
When S.P. is ₹ 180, C.P. is ₹ $\frac{100}{90} \times 180$
∴ C.P. = ₹ 200

Exercise 10.3

A. Find the gain or loss per cent.

1) C.P. = ₹ 50, S.P. = ₹ 60
2) C.P. = ₹ 1250, S.P. = ₹ 1000
3) C.P. = ₹ 12,000, S.P. = ₹ 9000
4) C.P. = ₹ 20.00, S.P. = ₹ 19.50

B. Find the selling price.

1) C.P. = ₹ 24, profit = 20%
2) C.P. = ₹ 2500, loss = 20%
3) C.P. = ₹ 64, profit = $6\frac{1}{4}$ %
4) C.P. = ₹ 350, loss = 5%

C. Find the cost price

1) S.P. = ₹ 125, profit = 25%
2) S.P. = 4800, profit = 20%
3) S.P. = ₹ 675, loss = 10%
4) S.P. = 1820, loss = 9%

D. Solve

1) A book was bought for ₹ 20.00 and sold for ₹ 25.00. Find the profit per cent.
2) A book was bought for ₹ 25.00 and sold for ₹ 20.00. Find the loss per cent.
3) Ganesh bought a house for ₹ 45,000 and sold it for ₹ 40,000. Find his loss per cent.
4) A milkman bought milk at ₹ 10.00 per litre and sold it at ₹ 12.50 per litre. Find his gain per cent.
5) 1 kg of butter was bought for ₹ 54 and sold for ₹ 52.50. Find the loss per cent.
6) A dozen pencils are bought for ₹ 6 and each sold for ₹ 0.60. Find the loss or gain per cent.
7) 100 mangoes are bought for ₹ 80. Out of these 100 mangoes, 10 are spoilt and have to be thrown away. If the remaining mangoes are sold at 85 paise each, find the loss or gain per cent.
8) Bishnu bought a house for ₹ 55,400 and sold it at a gain of 8%. Find his selling price.
9) Bholu bought bananas for ₹ 60. He wants to make a profit of $12\frac{1}{2}$ % on them. For how much should he sell the bananas?
10) A bicycle bought for ₹ 680 is sold at a loss of 5%. Find the selling price.
11) A book bought for ₹ 10.50 is sold at a gain of 20%. Find the selling price.
12) A scooter is sold at ₹ 9100 at a loss of 9%. Find the cost price of the scooter.



Maths Lab Activity 1

Set up a shop in the class. Use models or pictures of things that the shop sells (e.g. chocolates, toys, clothes etc). Mark the cost price and the selling price on each object.

Let some children be shopkeepers and the others be customers. Make the customers use paper money to buy things. Let shopkeepers calculate the profit or loss in each purchase made by a customer.

Rotate the shopkeepers and customers so that everyone gets a chance to be both.



• Simple Interest

When you put money in a piggy bank your money does not increase. Even after a year you will get the same amount which you had put in. But when you put your money in a Savings Bank Account in a bank, your money increases and you get more than what you put in. Why?

This is so because the bank uses your money to earn more money. And in return it pays you for using your money. The money you deposit or save in a bank is called the **principal** and the 'extra' money that the bank gives you is called the **interest** on your savings. This interest is also called **simple interest.**

Similarly, if you borrow money from someone or from a bank then you will have to pay interest on the money you borrow. Here again the money you borrow is called the principal and the interest you pay is called simple interest.

The simple interest is calculated as a percentage on the principal per year.

The total money returned is called the **amount.**

$$\therefore \text{ Amount} = \text{Principal} + \text{Interest}$$

• Rate of interest

The bank offers an interest of about 5% per annum on a Savings Bank Account. This means that an interest of ₹ 5 per year is given for every ₹ 100 invested in a Savings Bank Account.

Study the following table.

Depositor's name	Money deposited (Principal)	Rate of interest	Period for which money is deposited	Interest
Ram	₹ 1000	5%	1 year	₹ 50
Robert	₹ 3000	5%	1 year	₹ 150
Ahmed	₹ 1000	5%	2 years	₹ 100
Sita	₹ 1000	5%	3 years	₹ 150
Asha	₹ 2000	5%	1 year	₹ 100
Lucy	₹ 2000	8%	1 year	₹ 160

From the table it is clear that interest changes if the principal, interest or the period of time changes.

Therefore, the **interest depends on three factors:**

(i) **Principal** (ii) **Rate of interest** (iii) **Period of time** for which money is deposited

• Calculating interest

Interest depends on principal, rate of interest and the period of time for which money is deposited or borrowed.

Let us learn to calculate simple interest through a few examples.

Example 1 : Find the simple interest on ₹ 200 for 2 years at 10% per annum.

10% simple interest per annum means that on every ₹ 100 for 1 year, ₹ 10 is charged as simple interest.

Interest on ₹ 100 for 1 year $= ₹\ 10$

Interest on ₹ 1 for 1 year $= ₹\ \left(\frac{10}{100}\right)$

Interest on ₹ 200 for 1 year $= ₹\ 200 \times \left(\frac{10}{100}\right)$

Interest on ₹ 200 for 2 years $= ₹\ 200 \times 2 \times \left(\frac{10}{100}\right)$

Interest $= ₹\ \frac{200 \times 2 \times 10}{100} = ₹\ \frac{4000}{100} = ₹\ 40$

Therefore, simple interest on ₹ 200 for 2 years at 10% per annum is ₹ 40.

Note that interest is calculated as

$$\text{Simple interest} = \frac{\text{Principal} \times \text{Time} \times \text{Rate}}{100} = \frac{P \times T \times R}{100}$$

where P is the principal

T is the number of years or the time for which money is deposited or borrowed

and R is the rate of interest

Example 2 : Find the simple interest on ₹ 1200 for $4\frac{1}{2}$ years at 8% per annum. Also find the amount.

Principal (P) = ₹ 1200

Period (T) = $4\frac{1}{2}$ years = $\frac{9}{2}$ years

Rate of interest (R) = 8%

Simple interest $= \frac{P \times T \times R}{100}$

$= ₹\ 1200 \times \frac{9}{2} \times \frac{8}{100} = ₹\ \frac{\overset{12}{\cancel{1200}} \times 9 \times \overset{4}{\cancel{8}}}{\underset{1}{\cancel{2}} \times \underset{1}{\cancel{100}}}$

= ₹ 432

Simple interest = ₹ 432

Amount = Principal + Interest

= ₹ 1200 + ₹ 432 = ₹ 1632

∴ Amount = ₹ 1632

Exercise 10.4

A. Fill in the blanks.

Principal	Rate of interest	Time of deposit	Interest	Amount
1) ₹ 2500	10%	5 years	______	______
2) ₹ 560	8%	10 years	______	______
3) ₹ 1800	5%	2 years	______	______
4) ₹ 15000	11%	2 years	______	______
5) ₹ 6500	12%	3 years	______	______

B. Find the simple interest for 1 year on

1) ₹ 300 at 5%
2) ₹ 500 at 10%
3) ₹ 800 at 8%
4) ₹ 200 at 4%
5) ₹ 1000 at 12%

C. Find the simple interest on

1) 400 for 2 years at 10% per annum
2) 500 for 2 years at 5% per annum
3) 100 for 3 years at 5% per annum
4) 700 for 3 years at 12% per annum
5) 200 for 4 years at 10% per annum

D. 1) Raj borrowed ₹ 1200 for 3 years at 7% interest. Find the amount due from him.

2) A shopkeeper borrowed ₹ 4500 at 12%. What amount does he have to pay after $3\frac{1}{2}$ years?

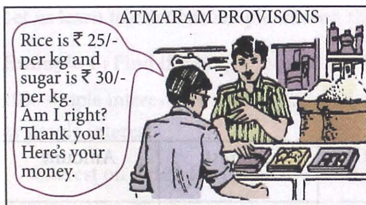
3) Ramesh borrowed from Ram a sum of ₹ 600 at 12% interest. He returned the money after 6 months. How much did he return to clear the debt?

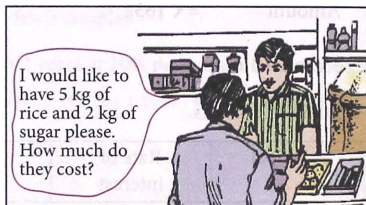
4) A man deposited ₹ 9000 in a bank which gave interest at 11%. What amount will he receive after 3 years and 4 months?

5) A moneylender lends money, collecting 5 paise for every rupee per month. Find the rate of interest.

• Bills (Life skill)

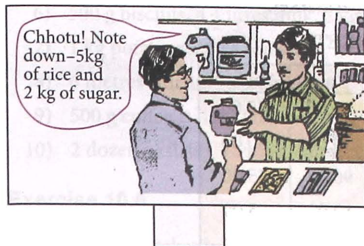
Here are six cartoon strips that show the conversation between a shopkeeper and a customer buying goods from the shop. Read the conversations in the balloons carefully and fill in the correct sequence of pictures in the boxes given below the pictures.

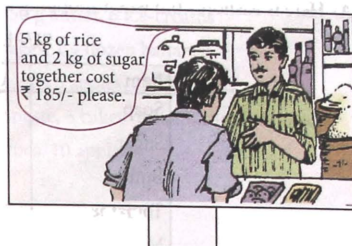












This is a copy of the bill given to the customer. Check to see if the total is correct.

ATMARAM PROVISIONS
GANDHI MARKET Ph. : 23693214

Item	Qty.	Rate	Cost
Rice	5 kg	25.00	125.00
Sugar	2 kg	30.00	60.00
Total			185.00

Exercise 10.5

A supermarket in Delhi displays the following prices.

Price List			
Sugar	₹ 30.00 per kg	Pencils	₹ 18.00 per dozen
Butter	₹ 90.00 per kg	Notebooks	₹ 120.00 per dozen
Coffee	₹ 450.00 per kg	Fountain pens	₹ 10.00 each
Rice	₹ 25.00 per kg	Toothpaste	₹ 27.00 each
Wheat	₹ 15.00 per kg	Light bulbs	₹ 6.00 each
Pulses	₹ 80.00 per kg	Shirting	₹ 120.00 per metre
Soap	₹ 15.00 per cake	Biscuits	₹ 220.00 per kg
Potatoes	₹ 6.00 per kg	Milk	₹ 32.00 per litre
Tomatoes	₹ 10.00 per kg	Pastries	₹ 108.00 per dozen
Cabbages	₹ 20.00 per kg	Sweets	₹ 80.00 per kg
Bananas	₹ 30.00 per dozen	Bread	₹ 15.00 per loaf
Apples	₹ 10.00 each	Ice-creams	₹ 20.00 each

A. Here is Kishore's bill when shopping at the supermarket.

SUPER MARKET

Item	Qty.	Rate	Amount
Soap	3	15.00	45.00
Sugar	1 kg	30.00	30.00
Butter	$\frac{1}{2}$ kg	90.00	45.00
Tomatoes	$\frac{1}{2}$ kg	10.00	5.00
Milk	2 ℓ	32.00	64.00
Total			₹ 189.00

Kishore paid with a five hundred rupee note. What is the change he got back?

B. Calculate the cost of the purchases below. What change would you receive in each case if you gave the cashier ₹ 500?

1)	Rate	Amount	2)	Rate	Amount
300 g coffee 200 g biscuits 750 g pulses 1 kg potatoes			500 g sweets 2 loaves bread 6 ice-creams 300 g butter		
Total			Total		
Change received back			Change received back		

3)	Rate	Amount	4)	Rate	Amount
3 doz. bananas 6 apples 500 g cabbages 2 kg tomatoes			12 pencils 8 notebooks 1 fountain pen 6 light bulbs		
Total			Total		
Change received back			Change received back		

C. Make bills for the following purchases. Use the supermarket price list.

1) 5 ice-creams, 2 dozen pastries, 250 g sweets, 2 $\frac{1}{2}$ litres milk, half a dozen apples
2) 4 kg sugar, 500 g butter, 2 kg coffee
3) 30 kg rice, 5 kg wheat, 4 kg pulses, 6 cakes of soap
4) 500 g potatoes, 2 kg tomatoes, 500 g cabbages, 1 loaf of bread, $\frac{1}{2}$ litre of milk.
5) 6 pencils, 3 notebooks, 1 fountain pen, 1 tube of toothpaste

6) 500 g biscuits, $4\frac{1}{2}$ litres milk, 2 kg sugar, 250 g butter, 6 ice-creams

7) 1 kg potatoes, 200 g tomatoes, $1\frac{1}{2}$ kg cabbages, $1\frac{1}{2}$ dozen bananas

8) 6 metres shirting, 3 ice-creams, $2\frac{1}{2}$ kg biscuits, 6 apples, 200 g sweets

9) 500 g coffee, 3 light bulbs, 3 tubes of toothpaste, 6 cakes of soap, 1 loaf of bread.

10) 2 dozen pastries, 10 ice-creams, 5 kg potatoes, 10 apples.

Exercise 10.6

A. Find the mistakes in each bill.

1) **LUCKY CLOTH STORES**

Babu Market Ph. 219350

Item	Qty.	Price	Cost
2×2 Blouse piece	4 pieces	50.00	20.00
Sarees	3	240.00	620.00
Total			640.00

2) **SUPER BAZAAR**

Item	Qty.	Price	Cost
Rice	10 kg	70.00	70.00
Moong Dal	2 kg	80.00	160.00
Sugar	5 kg	30.00	15.00
Tamarind	1 kg	40.00	40.00
Total			285.00

3) **LAKSHMI MUSICALS**

Item	Qty.	Price	Cost
1. Classical CD	3	45.00	125.00
2. Bhajans CD	2	28.00	56.00
3. Hindustani instrumental CD	4	32.00	128.00
Total			299.00

4) **BHARAT CROCKERY STORES**

Item	Qty.	Price	Cost
1. Dinner plate	12	15.00	180.00
2. Cups & saucers	12	20.00	250.00
3. Table-spoons	12	6.50	72.00
4. Tea-spoons	12	4.50	50.00
Total			552.00

WORKSHEET
for formative assessment



MCQs

1. Loss means

   a) SP > CP   b) CP = SP   c) CP > SP

2. The formula for profit per cent is

   a) $\frac{SP - CP}{SP} \times 100$ b) $\frac{CP - SP}{CP} \times 100$ c) $\frac{SP - CP}{CP} \times 100$ d) $\frac{CP - SP}{SP} \times 100$

3. Simple interest depends on:

   a) Cost price, selling price, profit   b) Amount, profit, time

   c) Amount, principal,.time   d) Principal, interest, time

Hots questions

1. Find the missing values in each case.

Principal (₹)	Interest (₹)	Rate	Time
600	456	……	8 years
……	56.55	6.5%	3 years
8000	…..	5%	5 years

2. By selling notebooks at the rate of ₹ 16 each, Ramu gained 20%. Find the cost of 100 notebooks.
3. In which of these will you earn more interest?
   a) Deposit ₹ 20000 at 8.75% simple interest for 3 years.
   b) Deposit ₹ 1,00,000 at 9% simple interest for 1 year
4. By selling 33m of cloth, Rajesh gains the selling price of 11m , Find the gain per cent. (***Hint:*** Let selling price be ₹ 100; then gain = ₹ (........ × 100).

Fun activity

Visit a departmental store, check out the cost of things and make **bills for the following purchases.**

1. 5 kg sugar, 2 kg coffee, 5 packs biscuits, 10ℓ of milk, 6 ice-creams.
2. 3 dozen notebooks, 2 dozen pencils, 5 Kg butter, 2 loaves of bread.
3. 5 kg apples, 200 g of turmeric, 12 kg sugar, 5 kg dal, 2 kg butter.
4. 200 g sugar, 500 g coffee, 200 g dal, 2 kg tomato, 500 g butter, 2 packets of biscuits.

Time

11

Learning Objectives



You will be able to:

- convert time from one unit to another.
- carry out addition and subtraction of time.
- read the arrival/departure time of trains.
- calculate distance and journey time between stations.

Warm Up



• Recall – Units of time

Minute, hour, day, week, month, and year are units of time.
A smaller unit of time is the **second.**
In some clocks there are three hands — the hour hand, the minute hand and the second hand.

The second hand moves the fastest. It takes 1 minute to go round the clock face once. The time taken by it to move from one small division to the next is called a **second.**

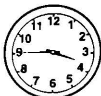
You know that there are 60 small divisons in the clock face.
Therefore 60 seconds = 1 minute
The table for units of time is as shown.

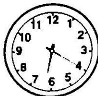
60 seconds	=	1 mintue
60 minutes	=	1 hour
24 hours	=	1 day
7 days	=	1 week
365 days	=	1 year
12 months	=	year

Recall that
- Time from 12 midnight to 12 noon is denoted by a.m. (ante meridian)
- Time from 12 noon to 12 midnight is denoted by p.m. (post meridian)
- When it is exactly 12 noon or 12 midnight we do not write a.m. or p.m

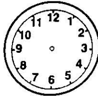
Recall exercise

1. Write what time it is on the clock.

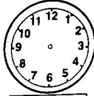




2. Draw the hands of the clock to show the time.



6:30



2:15

3. Write the time using a.m. or p.m.

a) 2 : 45 in the afternoon : ________
b) 2 : 20 after midnight : ________
c) 6 : 30 in the evening : ________
d) 9 : 25 in the morning : ________
e) 4 : 25 in the morning : ________
f) 10 : 25 before noon : ________

4. What time is it?

a) 1 hour after 3 : 35 a.m. : ________
b) 10 minutes before 12 noon : ________
c) 30 minutes after 11 : 30 a.m. : ________
d) 2 hours after 12 midnight : ________

• Conversion of time – hours and minutes

The following examples show you how to convert from one unit to another.

Example 1: Convert 4 hours into minutes.

1 hour = 60 minutes

4 hours = 4 × 60 minutes

= **240 minutes**

Example 2: Convert 2 hours 35 minutes to minutes.

2 hours 35 minutes = 2 × 60 minutes + 35 minutes

= 120 minutes + 35 minutes

= **155 minutes**

Example 3: Convert 240 minutes into hours.

240 minutes = 240 ÷ 60 hours

= **4 hours**

Example 4: Convert 400 minutes into hours and minutes

400 minutes = 400 ÷ 60 hours

400 ÷ 60 gives quotient 6 and remainder 40

∴ 400 minutes = **6 hours 40 minutes**

• Conversion of time – minutes and seconds

Example 1: Convert 3 minutes into seconds.

1 minute = 60 seconds

∴ 3 minutes = 3 × 60 seconds

= **180 seconds**

Example 2: Convert 5 minutes and 20 seconds into seconds.

5 minutes 20 seconds = 5 × 60 seconds + 20 seconds

= 300 seconds + 20 seconds

= **320 seconds**

Example 3: Convert 360 seconds to minutes.

360 seconds = 360 ÷ 60 minutes

= ☐ **minutes**

Example 4: Convert 450 seconds to minutes.

450 seconds = 450 ÷ 60 minutes

450 ÷ 60 gives quotient ☐ and remainder ☐

∴ 450 seconds = ☐ **minutes** ☐ **seconds**

Exercise 11.1

A. Convert into minutes.

1) 5 hours
2) 10 hours
3) 24 hours
4) 1 hour 30 minutes
5) 10 hours 10 minutes
6) 8 hours 45 minutes

B. Convert into hours and minutes.

1) 75 minutes
2) 200 minutes
3) 600 minutes
4) 550 minutes
5) 6600 minutes
6) 380 minutes

C. Convert into seconds.

1) 5 minutes
2) 15 minutes
3) 60 minutes
4) 3 minutes 10 seconds
5) 10 minutes 5 seconds
6) 12 minutes 55 seconds

D. Convert into minutes and seconds.

1) 480 seconds
2) 600 seconds
3) 3600 seconds
4) 500 seconds
5) 820 seconds
6) 1550 seconds

• Conversion of time—bigger units

The table for units of time shows that 30 days = 1 month, 365 days = 1 year.

However you know that January, March, May, July, August, October, and December have 31 days. February has 28 or 29 days (29 days in a leap year).

Also a leap year has 366 days.

However, for conversion we use 30 days = 1 month and 365 days = 1 year.

Example 1: Convert 3 years 10 days into days.

3 years 10 days = 3 × 365 days + 10 days
= 1095 days + 10 days
= **1105 days**

Example 2: Convert 6 months 10 days into days.

6 months 10 days = 6 × 30 days + 10 days
= 180 days + 10 days
= **190 days**

Example 3: Convert 10 weeks 5 days into days.

10 weeks 5 days = 10 × 7 days + 5 days
= 70 days + 5 days
= **75 days**

Example 4: Convert 95 days into
(i) weeks and days (ii) months and days

(i) 95 days = 95 ÷ 7 weeks
= **13 weeks 4 days**

(ii) 95 days = 95 ÷ 30 months
= **3 months 5 days**

Exercise 11.2

A. Convert into days.

1) 2 years 2) 5 years 100 days 3) 10 months
4) 5 months 15 days 5) 7 weeks 6) 20 weeks 5 days

B. Convert into weeks and days.

1) 49 days 2) 360 days 3) 45 days 4) 10 days

C. Convert into months and days.

1) 120 days 2) 365 days 3) 45 days 4) 60 days

D. Convert into months (Remember 1 year = 12 months)

1) 5 years 2) 10 years 3) 4 years 5 months 4) 6 years 6 months

E. Convert into years and months.

1) 72 months 2) 50 months 3) 100 months 4) 60 months

• Addition of time

Addition of time is different from addition of ordinary numbers. This is because conversion from one unit to another is not done in tens. Study the examples.

Example 1: Add 10 minutes 30 seconds and 15 minutes 45 seconds.

minutes	seconds
①	
10	30
15	45
26	15

Ans: **26 minutes 15 seconds**

Step 1: Add the seconds

30 seconds + 45 seconds = 75 seconds

75 seconds = 60 seconds + 15 seconds

= 1 minute + 15 seconds

Write 15 seconds in the seconds column and carry over 1 minute to the minutes column.

Step 2: Add the minutes

10 minutes + 15 minutes + ① minute = 26 minutes

Example 2: Add 5 hours 40 minutes and 8 hours 45 minutes.

hours	minutes
①	
5	40
8	45
14	25

Ans: **14 hours 25 minutes**

Step 1: Add the minutes

40 minutes + 45 minutes = 85 minutes

85 minutes = 1 hour + 25 minutes

Write 25 minutes in the minutes column and carry over 1 hour to the hours column.

Step 2: Add the hours

5 hours + 8 hours + ① hour = 14 hours

Example 3: Add 10 years 6 months and 15 years 8 months.

years	months
(1)	
10	6
15	8
26	2

Ans: **26 years 2 months**

Step 1: Add the months

6 months + 8 months = 14 months

14 months = 1 year + 2 months

Write 2 months in the months column.

Carry over 1 year to the years column.

Step 2: Add the years.

10 years + 15 years + 1 year = 26 years

Exercise 11.3

A. Add.

1) 5 hours 40 minutes and 6 hours 25 minutes.
2) 4 hours 50 minutes and 10 hours 10 minutes.
3) 7 minutes 50 seconds and 3 minutes 40 seconds.
4) 25 minutes 40 seconds and 20 minutes 15 seconds.
5) 5 years 8 months and 8 years 5 months.
6) 6 years 6 months and 8 years 6 months.

• Subtraction of time

While subtracting time you have to be careful while converting from one unit to another.

Example 1: Subtract 20 minutes 30 seconds from 30 minutes 20 seconds.

	minutes	seconds
	29	80
	~~30~~	~~20~~
−	20	30
	9	50

Ans: **9 minutes 50 seconds**

Step 1: Since 30 seconds > 20 seconds, borrow 1 minute from 30 minutes and convert into seconds.

You now have 60 seconds + 20 seconds = 80 seconds

Now subtract the seconds: 80 seconds − 30 seconds = 50 seconds

Step 2: Subtract the minutes.

29 minutes − 20 minutes = 9 minutes

Example 2: Subtract 5 hours 35 minutes from 10 hours 20 minutes.

	hours	minutes
	9	80
	~~10~~	~~20~~
−	5	35
	4	45

Ans: **4 hours 45 minutes**

Step 1: Since 35 minutes > 20 minutes, borrow 1 hour from 10 hours and convert into minutes.

You now have 60 minutes + 20 minutes = 80 minutes.

Subtract the minutes: 80 minutes − 35 minutes = 45 minutes.

Step 2: Subtract the hours.

9 hours − 5 hours = 4 hours

Exercise 11.4

A. Subtract.

1) 3 hours 50 minutes from 5 hours 20 minutes.
2) 10 hours 15 minutes from 11 hours.
3) 15 minutes 50 seconds from 25 minutes 10 seconds.
4) 25 minutes 10 seconds from 50 minutes 5 seconds.
5) 19 years 6 months from 25 years
6) 6 years 8 months from 10 years 6 months

• Railway Time-Table (Life skill)



The Indian Railways run thousands of trains a day carrying lakhs of people every day. If you plan a holiday far away from your home, then what necessary information will you need in advance to plan your journey? You will need to know the various trains running between the two places, their arrival and departure timings, the distance between the two stations, etc. To help passengers, the Indian Railways publish a **Railway Time-table** which provides this information.

Let us look at one page of the Railway Time-table.

1. The table has a title indicating the route. The title of the specimen table given here is "Delhi-Agra-Gwalior-Bhopal-Mumbai VT."
2. The table has 14 columns.
3. Column 8 indicates various stations on the route.
4. Column 1 indicates the distances of various stations from Delhi on the route.
5. Columns 2 to 7 show the trains, their timings of arrival at and departure from various stations in the direction Delhi to Mumbai. This is called the downward direction (↓). These are called the down (DN) trains.

What is the information given to us by this table?

Table 'P'

DELHI-AGRA-GWALIOR-BHOPAL-BOMBAY V.T.

Kms. Ex. Delhi	2628 Express	4678 Jammu Tawi Pune Exp.	2180 Taj Exp.	1150 Maha-Koshal Exp.	1038 Punjab Mail	1058 Amritsar Dadar Exp.	STATIONS	2179 Taj Exp.	1037 Punjab Mail	1057 Dadar Amritsar Exp.	1149 Maha-Koshal Exp.	4677 Pune-Jammu Tawi Exp.	2627 Express
		10 15	—		06 15	20 00	a NEW DELHI	d —	20 55	08 00	—	21 40	
	23 20	10 50	07 05		07 15	20 50	d	a 22 00	20 10	07 05	—	21 05	11 55
145				—			a HAZRAT	d 21 35					
				16 20		21 05	d NIZAMUDDIN	a 19 40	19 50	06 39	10 30	—	11 30
199		12 50	08 57	18 15	09 22	23 25	a MATHURA	d 19 35	17 25	02 40	07 48	18 28	
		12 53	09 00	18 20	09 27	23 30	d	a 18 45	17 20	02 35	07 43	18 25	
317	01 54	13 42	09 50	19 20	10 20	00 32	a AGRA CANT.	d 18 35	16 20	01 30	06 30	17 30	08 01
	01 57	13 50	10 00	19 28	10 35	00 47	d	a 17 00	16 05	01 15	06 20	17 22	07 58
414	03 33	15 43	11 50	21 30	12 45	03 45	a GWALIOR	d —	14 15	23 25	04 10	15 37	06 33
	03 36	15 48	—	21 38	12 55	03 53	d	a	14 05	23 15	04 00	15 32	06 30
567	04 52	17 20		23 20	14 40	05 50	a JHANSI	d	12 40	21 30	02 25	14 10	05 10
	05 07	17 35		23 35	15 00	06 10	d	a	12 25	21 15	02 10	13 55	04 55
705		20 25			17 45	08 55	a BINA	d	10 05	18 30		11 43	
		20 33			17 55	09 10	d	a	09 50	18 25		11 35	
747	08 50	22 40			20 32	11 40	a BHOPAL	d	07 25	15 50		09 30	01 18
	08 58	22 48			20 42	12 00	d	a	07 15	15 35		09 22	01 12
974	10 22	00 38			22 35	14 10	a ITARSI	d	05 20	13 25		07 20	23 27
	10 42	00 53			22 55	14 25	d	a	05 05	13 10		07 15	23 17
1098	13 05	03 21			01 35	17 25	a KHANDWA	d	02 30	09 55		04 52	20 55
	13 10	03 26			01 40	17 30	d	a	02 25	09 50		04 47	20 50
1282	15 05	05 26			03 40	19 50	a BHUSAVAL	d	00 30	07 20		02 55	18 55
	15 20	05 40			04 00	20 10	d	a	00 10	07 00		02 40	18 35
	18 00	08 32			06 43	23 45	a MANMAD	d	21 22	03 51		23 55	15 55
	18 10	08 40			06 51	23 25	d	a	21 15	03 43		23 45	15 45
1542					11 55	05 00	a DADAR	d	16 28	22 50			
						—	d	a					
	15 15	14 30			12 25		a MUMBAI VT	d	16 15			17 45	18 15

6. Columns 9 to 14 show the trains, their timings of arrival and departure from various stations in the upward direction (↑). These are called up (UP) trains.
7. All trains on the route have a number. It is indicated in the row below the title. There are six trains on this route and their numbers are
   2628, 4678, 2180, 1150, 1038, 1058 in the DN-direction and
   2179, 1037, 1057, 1149, 4677, 2627 in the UP-direction.

Example :

From the given table find the distances between :

a) Jhansi and Gwalior

b) Bhopal and Bhusaval

c) New Delhi and Mumbai VT

The distance between Jhansi and Gwalior = 567 km – 414 km
= 153 km

The distance between Bhopal and Bhusaval = 1282 km – ____ km
= ____ km

The distance between New Delhi and Mumbai VT = ____ km – ____ km
= ____ km

Exercise 11.5

Using the given table fill in the timings as required below.

Train number	Arrival at	Time	Departure from	Time
2628	Gwalior	0452	Jhansi	0507
	Itarsi	1022	Manmad	1810
4678	Agra Cant.	____	Gwalior	____
	Khandwa	____	Manmad	____
1037	Mathura	____	Itarsi	____
	Bhopal	____	Dadar	____
1057	Manmad	____	Bhusaval	____
	Hazrat Nizamuddin	____	Khandwa	____

Exercise 11.6

A. Read the time-table and answer the following questions.

Table G **CHENNAI-SURAT-AHMEDABAD**

	2642 Exp. (1,3,4,7)		STATIONS		2641 Exp. (1,2,5,6)
	10 00	d	CHENNAI	a	17 15
	12 25	a	GUDUR	d	15 00
	12 35	d		a	14 55
432	17 10	a	VIJAYAWADA	d	10 05
	17 20	d		a	09 45
600	21 00	a	KAZIPET	d	06 00
	21 20	d		a	05 40
895	01 25	a	BALHARSHAH	d	01 50
	01 35	d		a	01 40
1020	03 50	a	WARDHA	d	23 29
	03 58	d		a	23 24
1334	09 15	a	BHUSAVAL	d	18 05
	09 30	d		a	17 50
1670	16 20	a	SURAT	d	10 50
	16 30	d		a	10 40
1799	18 18	a	VADODARA	d	08 48
	18 25	d		a	08 40
1834	19 10	a	ANAND	d	07 57
	19 13	d		a	07 55
1899	20 40	a	AHMEDABAD	d	06 50

1) What is the title of the table? ____________
2) How many columns does the table have? ____________
3) What does column 1 indicate? ____________
4) How many trains are there on this route? ____________
5) What is the number of the DN-train? ____________
6) What is the number of the UP-train? ____________
7) Find the distances between:
   a) Kazipet and Wardha ____________
   b) Bhusaval and Surat ____________
   c) Surat and Anand ____________
   d) Chennai and Ahmedabad ____________
8) Find the time table for the following journeys.
   a) Chennai to Gudur
   b) Chennai to Kazipet
   c) Chennai to Surat
   d) Chennai to Ahmedabad
   e) Ahmedabad to Vadodara
   f) Vadodara to Kazipet
   g) Kazipet to Chennai
   h) Ahmedabad to Chennai

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MCQs

1. How many seconds are there in a day?

   a) 60 × 60 b) 24 × 60 c) 24 × 60 × 60 d) 24

2. When the time is quarter past 1, the hour hand is at:

   a) between 12 and 1 b) 12 c) 1 d) between 1 and 2

3. If 1st of October is Saturday then the number of Sundays in the month of October is:

   a) 4 b) 5 c) 3 d) 6

4. If you go to sleep at 8:25 p.m and wake up at 6:15 a.m, for how long did you sleep?

   a) 8 hours 50 minutes b) 10 hours 50 minutes
   c) 9 hours 50 minutes d) 7 hours 45 minutes

5. A train leaves the station at 9:25 p.m and reaches destination at 5:10 a.m.
   The duration of the journey is:

   a) 7 hours 15 minutes b) 7 hours 35 minutes
   c) 7 hours 45 minutes d) 8 hours 15 minutes

Hots question

1. What will it be tomorrow, if yesterday was two days after Tuesday?

Fun activity

Find out :

1. a) How many times per minute does your heart beat?
   b) Try going for a run and then measure it again.
   What happened? Why? (***Hint:*** refer your science book)
   c) How many beats would your heart make in :
   One hour?
   One day?
   One week?
   One year?
2. If it is 10 a.m in Perth, what time will it be in New Delhi, London, New York and Dhaka? Why is there a difference?

Representing Information in Graphical Form

12

Learning Objectives



You will be able to:

- read and interpret pictographs, bar graphs and circle graphs.
- draw graphs to represent simple data.

Warm Up



- **Recall**

1. The names of students in Adarsh Primary School who got 100 marks in mathematics are as follows.

   Class I : John, Ram, Ali, Jane, Seema, Rita

   Class II : Sama, Ravi, Ahmed, Peter, Nisha

   Class III : Sunil, Laxmi, Hema

   Class IV : Priya, Amit, Sonu, Bobby, Mita, Sameer, Lalit

   Class V : Sabina, Rakesh, Raghu, Leena, Rinita

The above information was represented in a table with tally marks

Class	Tally marks	Numbers
I	𝍸 /	6
II	𝍸	5
III	///	3
IV	𝍸 //	7
V	𝍸	5

Information presented in this way in the form of numbers is called **data.**

Here the data about students is presented in the form of a **table.**

2. Pictograph : The same data can be presented through pictures as follows.

Number of students with 100 marks in mathematics

Class I	
Class II	
Class III	
Class IV	
Class V	

Here one represents 1 child.

This is known as a **pictograph.** Use the pictograph to answer the following questions.

(i) In which class is the number of students with 100 in mathematics the greatest?

(ii) In which class is the number of students with 100 in mathematics the least?

(iii) How many more students with 100 in mathematics are there in Class IV than in Class II?

(iv) In which two classes are the number of students with 100 in mathematics the same?

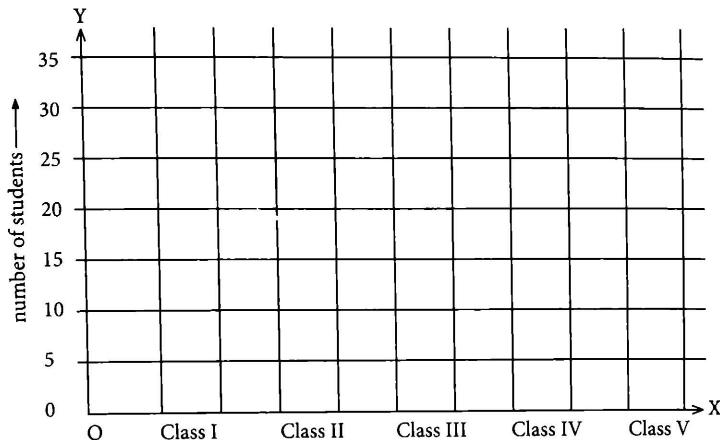
• Bar graph

Modern Public School is a very big school. The information on number of children who got 100 in mathematics in each class in this school is presented in a tabular form.

Class	I	II	III	IV	V
No. of students with 100 in mathematics	15	30	25	35	20

The number of children is much larger than in Adarsh Primary School. It will take a long time to draw the pictograph. It will also be difficult to read the information. In such cases it is better to present the information in the form of a **bar graph.**

Number of students with 100 in mathematics in Modern Public School



The procedure for drawing the bar graph is as follows.

Step 1 : Draw a horizontal line segment OX. Mark points at convenient intervals (say 1 cm) on the line. Write 'Class I', 'Class II' ..... 'Class V' as shown in the figure.

Step 2 : Draw a vertical line segment OY at O. Mark points at convenient intervals (say 1 cm) on this line. Label these points 0, 5, 10, 15, 20, 25, 30, 35. Write 'number of students' along the vertical line. Here 1 cm represents 5 children. You can use a different scale also. For example 1 cm can be used to represent 10 children.

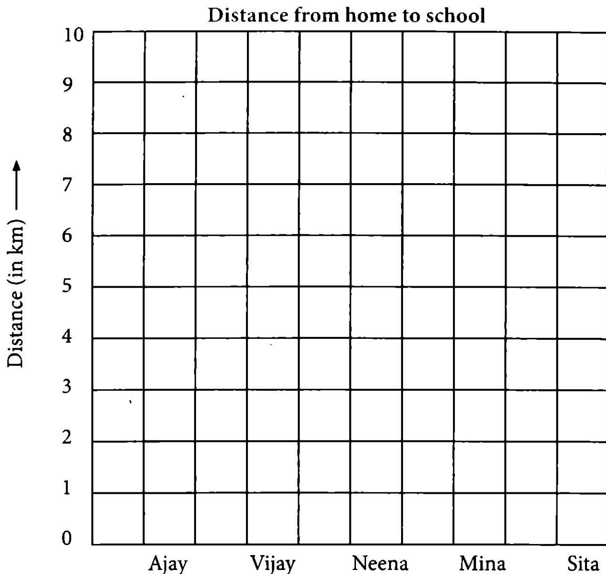
Step 3 : Draw bars of equal thickness for each class, using your ruler. The top of each bar should show the number of students. You can shade or colour the bars.

Step 4 : Write the title of the bar graph.

Now complete the bar graph below, using the given data.

Distances of homes of students from their school.

Name of student	Ajay	Vijay	Neena	Mina	Sita
Distance from home to school	3 km	5 km	1 km	10 km	7 km





- **Circle graphs**

The table shows the number of flowers sold in a day.

Kind of flower	Lotus	Rose	Orchid	Jasmine	Total
Number of flowers	20	10	5	5	40

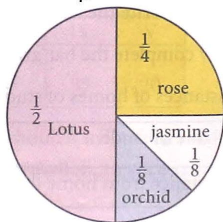
Data in the table can be represented using a circle graph.

Here the whole circle represents the total number of flowers sold in a day, i.e. 40

Lotus – 20 out of 40 were sold

$= \frac{20}{40} = \frac{1}{2}$ of the total

that is, half of the circle represents lotus.



Rose – 10 out of 40 were sold

$= \frac{10}{40} = \frac{1}{4}$ of the total

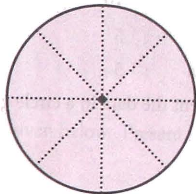
that is , one-fourth of the circle represents rose.

Orchid – 5 out of 40 were sold $= \frac{5}{40} = \frac{1}{8}$ of the total
that is, one-eighth of the circle represents orchid.

Jasmine – 5 out of 40 were sold $= \frac{5}{40} = \frac{1}{8}$ of the total
that is, one-eighth of the circle represents jasmine.

Now complete the circle graph using the given data.

Days	Monday	Tuesday	Wednesday	Total
Ice-creams sold	36	9	18	72



Monday = 36 out of 72 sold
= ___ = ___ of total

Tuesday = 9 out of 72 sold
= ___ = ___ of total

Wednesday = ...

Exercise 12.1



CD *activity* **17**
Jetpack jenny

1. The number of students in each class in a school is
Class I – 30, Class II – 42, Class III – 40, Class IV – 38,
Class V – 45 Present this data in tabular form.
2. The marks obtained out of 10 by Sumit in different subjects is:
English – 7, Hindi – 8, Maths – 10, Science – 7, Social Studies – 6,
Computers – 5.
Present the information (i) in tabular form (ii) in a pictograph.
3. Draw a bar graph to represent the number of children who play different games in Jyoti School.

Games played	Hockey	Football	Cricket	Volleyball
Number of students	𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	𝍸 𝍸 𝍸 𝍸

4. A school library has 600 fiction books, 100 science books, 150 maths books and 350 books in other subjects. Present the data:
(i) in tabular form.
(ii) in the form of a bar graph. Use scale of 1 cm representing 50 books.
5. Draw a bar graph to represent the following data.

Student	Ankit	Somya	Jaydeep	Mansi	Rahul
Marks obtained in Maths	95	90	35	55	85

Which scale will be better — 1 cm representing 5 marks or 1 cm representing 10 marks?

6. 40 Children of class 5 A were asked about the snack they liked the most. The result was as follows:

   Samosa : 20

   Dhokla : 10

   Pizza : 5

   Vada : 5

   Represent the data in a circle graph.

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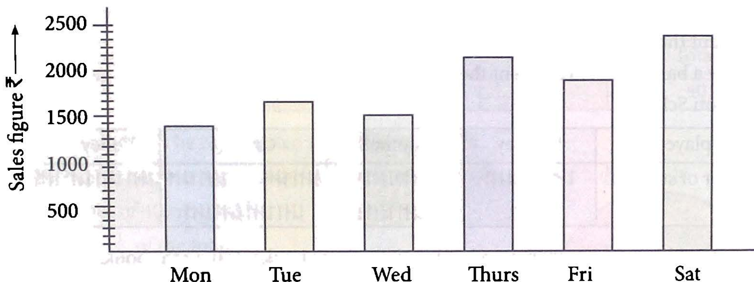
MCQs

Study the given bar graph on the daily sales record of a book store

Mon : ₹ 1400 Thurs : ₹ 2100

Tues : ₹ 1700 Fri : ₹ 1900

Wed : ₹ 1500 Sat : ₹ 2300



1. On which day was the highest sale recorded?

   a) Monday

   b) Thursday

   c) Saturday

   d) Thursday and Saturday

2. The number of days when the sale was ₹ 200 less than the previous day's sale is

a) 1 c) 3

b) 2 d) None

3. Which day had the lowest sale?

a) Thursday c) Monday

b) Wednesday d) Saturday

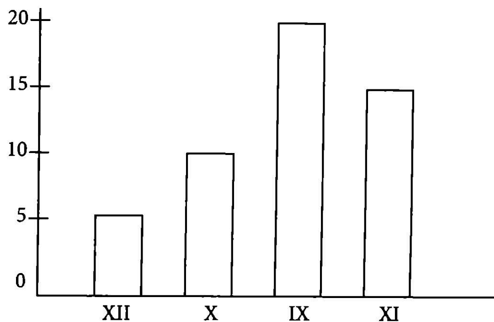
4. On which two days was the total sale ₹ 4000?

a) Monday and Wednesday b) Tuesday and Saturday

c) Thursday and Friday d) b and c

Hots question

1. A bar graph of the number of student in each class is given below. Present it in a tabular form:



Fun activity

Conduct a survey in your class and collect information for:

a) Favourite fruit b) Favourite drink

c) Favourite actor d) Favourite actress

e) Favourite game

Represent the data in a tabular form and in a bar graph.

Try making a circle graph with your teacher's/parent's help.

Number Patterns

13

Learning Objectives



You will be able to:

- recognise the rule followed by a given number pattern.
- say what triangular and square numbers are.

Warm Up





CD activity
18
Mad Dr jo



Maths Lab Activity 1

Look at the pattern below.





Can you say what the next figure will be? How did you find out?

Now look at the series of numbers below.

1, 2, 4, 8, 16, ...

Can you say what the next number will be?

It is easy to see that each number is double the number on the left. So the next number is 32. The number after that will be ________ and so on.

Look at this series of numbers.

2, 5, 8, 11, 14, ...

Here 3 is added to each number to get the next number. Can you find the next two numbers?

Let us take a more difficult pattern.

1, 3, 7, 15, 31, ...

Can you figure out what rule is followed to make the pattern?

Each number is doubled, and then 1 is added to it to get the next number!

$1 \times 2 + 1 = 3$

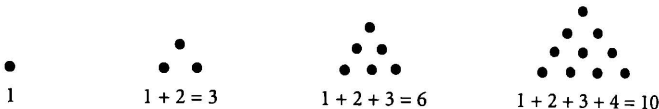
$3 \times 2 + 1 = 7$ and so on

Now you can easily say what the next number will be.

• Number Patterns

Triangular numbers

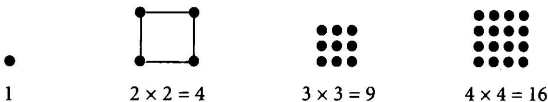
The numbers which can be arranged as dots in a triangle pattern are termed as **triangular numbers.**



Numbers 1, 3, 6, 10, 15, ... are called **triangular numbers**. The first ten triangular numbers are: 1, 3, 6, 15, 28, 36, 45, 55, ______, ______

Square numbers

Numbers which can be arranged as dots in a square pattern are called square numbers



Numbers 4, 9, 16, 25, ... are called **square numbers**. They are the products of the numbers 1, 2, 3, ... multiplied by themselves. The first ten square numbers are:

1, 4, 9, 16, 25, 36, 49, 64, ______, ______

Some more patterns

Study the pattern given below and write the next two terms

1.
$1 \times 8 + 1 = 9$
$12 \times 8 + 2 = 98$
$123 \times 8 + 3 = 987$
$1234 \times 8 + 4 = 9876$
_ _ _ _ _ _ _ _ = _ _ _
_ _ _ _ _ _ _ _ _ = _ _ _ _ _

2.
$9 \times 9 + 7 = 88$
$98 \times 9 + 6 = 888$
$987 \times 9 + 5 = 8888$
$9876 \times 9 + 4 = 88888$
_ _ _ _ _ _ _ _ = _ _ _ _
_ _ _ _ _ _ _ _ _ = _ _ _ _ _

Exercise 13.1

1. What rule is followed to get the following patterns? What are the next two numbers in each pattern?

   a) 1, 3, 5, 7, 9, ...   b) 1, 3, 9, 27, ...   c) 2, 3, 5, 9, 17, ...

   d) 1, 4, 13, 40, ...   e) 1, 2, 5, 14, ...

2. Write the multiplication table of 6 and find out the pattern it follows.
3. Find any two numbers which are both traingular and square numbers.
4. Fill in the blanks with triangular numbers and find the sum.

   i) ___ + 3 + 5 + ___ = ☐

   ii) ___ + 3 + 5 + ___ + 9 + ___ = ☐

   What do you notice about the sums?

5. Complete the pattern by shading dots. One is done for you.

   a) [10 × 10 grid of dots, 3 × 3 shaded] 9

   b) [10 × 10 grid of dots] 16

   c) [10 × 10 grid of dots] ___



Maths Lab Activity 2

Try to make your own patterns. See if your friends can find out the rules!

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MCQs

Which is the right set of numbers to complete the pattern?

1. 5, ___ , 17 ___ , 29

   a) 12, 12   b) 11, 23   c) 11, 12   d) 10, 15

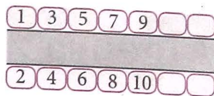
2. 3, ___ , ___ , ___ , 35

   a) 9, 10, 11   b) 13, 21, 30   c) 11, 19, 27   d) 6, 9, 12

3. 13, ___ , ___ , 55, ___

   a) 25, 40, 67   b) 27, 41, 69   c) 29, 43, 70

Hots question



The illustration shows the pattern of house numbers on a street.
The numbers on five houses next to each other add up to 55.
What are those five numbers?
Do they follow a pattern?

Fun activity

How will you find the sum of consequtive numbers: 1+ 2 + 3 + 4 + 6 + 7 + 8 ?

You can add this way: 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = ?

3 + 3 + 4 + 5 + 6 + 7 + 8

6 + 4 + 5 + 6 + 7 + 8

10 + 5 + 6 + 7 + 8

15 + 6 + 7 + 8

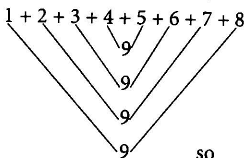
21 + 7 + 8

28 + 8 = 36

This takes time.

You can add in another way

1 + 2 + 3 + 4 + 5 + 6 + 7 + 8



so $4 \times 9 = 36$

Use this shorter method to find the sum.

(i) 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10

(ii) 1 + 2 + 3 + 4 + 5 + ... + 20

Now let us work out a much faster method.

Observe the sums:

4 numbers : 1 + 2 + 3 + 4 $= 10 = \frac{4}{2} \times 5$

5 numbers : 1 + 2 + 3 + 4 + 5 $= 15 = \frac{5}{2} \times 6$

6 numbers : 1 + 2 + 3 + 4 + 5 + 6 $= 21 = \frac{6}{2} \times 7$

8 numbers : 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 $= 36 = \frac{8}{2} \times 9$

Use this pattern to find :

1. The sum of numbers from 1 to 25
2. The sum of numbers from 1 to 100
3. Think ! how can you use the method to find the sum of numbers from 26 to 100 ?

Algebra

(optional chapter)

14

Learning Objectives



You will be able to:

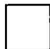
- find the value of a simple algebraic expression.
- simplify a simple algebraic expression.

Warm Up



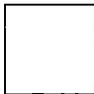
- **Recall**

A.



1 cm

B.



2 cm

C.



3 cm

Look at the three squares. Can you find the perimeter of these squares?

Perimeter of square A = 1 cm + 1 cm + 1 cm + 1 cm = 4×1 cm = 4 cm

Perimeter of square B = 2 cm + 2 cm + 2 cm + 2 cm = 4×2 cm = 8 cm

Perimeter of square C = 3 cm + 3 cm + 3 cm + 3 cm = 4×3 cm = 12 cm

Here we are working with numbers such as 1, 2, 3, 4, ...

Working with number is **Arithmetic.**

- **What is Algebra?**

If you look at the perimeter calculations above, you will find that perimeter of a square is given by $4 \times$ side of the square

Now let us represent the 'side of square' by s.

We can then write the perimeter of a square as $4 \times s$

s is a symbol that represents the side of square.

Example : Find the perimeter of a square of side = 10 cm.



We know that perimeter of a square is $4 \times s$ and $s = 10$ cm.

Therefore perimeter is 4×10 cm = 40 cm

Answer : 40 cm

In this example we have used both numbers and symbols. This is **Algebra.**

What is the difference between Arithmetic and Algebra?

In Arithmetic we only use numbers, but in Algebra we use numbers and symbols.



• Constants and variables

Numbers have fixed values. For example, 5 is always 5. It does not change.

Numbers are therefore called **constants.**

The number of days in a week is a constant. It is always 7.

The number of months in a year is also a constant. It is always 12.

Symbols can have different values. For example s (side of a square) can be 1 cm, 2 cm, 3 cm, 10 cm or anything else. Since the values of symbols can vary, they are called **variables.** The letter used to represent a variable is called a **literal number.**

The number of days in a month is a variable. It can be 30, 31, 29 or 28.

• Addition and subtraction

In Arithmetic, the sum of two numbers say 6 and 4 is denoted by $6 + 4$.

In Algebra, the sum of a literal number and a constant, say x and 5, is denoted by $x + 5$

The sum of two literal numbers, say p and q is denoted by $p + q$

Similarly $x - 3$ denotes that the constant 3 is subtracted from the literal number x.

$x - y$ denotes that the literal number y is subtracted from the literal number x.

• Multiplication and division

We know that	$3 + 3 + 3 + 3 = 4$ times $3 = 4 \times 3$
Similarly	$a + a + a + a = 4$ times $a = 4 \times a$
and	$b + b = 2$ times $b = 2 \times b$

In Algebra we omit the multiplication sign between a number and a literal number, or between two literal numbers. Thus

$5 \times y$ is written as $5y$

$x \times y$ is written as xy

Also, the product $a \times 4$ is written as $4a$ and not $a4$

When a literal number x is divided by y, it is denoted as $\frac{x}{y}$

$20 \div n$ is written as $\frac{20}{n}$

$x \div 5$ is written as $\frac{x}{5}$

Examples :

1. There are 30 boys and x girls in a class. The total number of students is given by $30 + x$
2. 7 more than q is written as $q + 7$
3. 6 added to the product of 5 and z is written as $5z + 6$
4. 3 times a number y is $3y$.

Exercise 14.1

Write the following using numbers, literal numbers and signs of basic operations.

1) 4 less than a number x
2) 5 added to the product of 3 and y
3) One-half of a number z
4) Sum of two numbers p and q
5) 6 taken away from the sum of 7 and x
6) 7 divided by the difference of p and 2
7) Twice the number x added to three times a number y
8) The product of the length and breadth of a rectangle

• Coefficients

$3a$ represents '3 times a'. Here the constant 3 is said to be the coefficient of the variable a.

In $5xy$, both x and y are variables. 5 is the coefficient of xy.

A coefficient can also have a variable.

For example in $5xy$, $5x$ is the coefficient of y. $5y$ is the coefficient of x.

In a, the coefficient of a is 1 since $a = 1 \times a$

Exercise 14.2

Find the coefficients of the variables given in brackets.

1) $8z$ (z)	2) $80x$ (x)	3) $4xy$ (xy)	4) ab (b)	5) $10y$ (y)
6) mn (m)	7) $4xyz$ (yz)	8) $44yz$ (yz)	9) $9pq$ (p)	10) pqr (pr)

When you want to say something you use an **expression.**

'My name is Deepak' is an expression in English.

8 + 9 is an expression in Arithmetic. It is called an **arithmetic expression.**

Similarly $a + b$ is an algebraic expression.

$4x$, $\frac{m}{n}$, $a - 4$ are all **algebraic expressions.**

a and b are called the **terms** of the algebraic expression $a + b$.

Similarly $3xy$, $-4z$ and 6 are the **terms** of the algebraic expression $3xy - 4z + 6$.

In an algebraic expression the terms are those which are separated by + or – signs.

Note however that the sign + or – is a part of a term. A + sign is understood and is generally not written.

• Value of an algebraic expression

We have seen that the perimeter of a square is given by $4 \times s$ or $4s$.

$4s$ is an algebraic expression. If we are given that $s = 2$ cm, we can find the value of this expression.

When $s = 2$ cm, $4s = 4 \times 2$ cm $= 8$ cm

We say that the value of the algebraic expression $4s$ when $s = 2$ is 8.

Example 1 : Find the value of $a + b + 4$ if $a = 1$, $b = 2$.

$a + b + 4 = 1 + 2 + 4 = 7$ **Answer : 7**

Example 2 : Find the value of $2x + 3y$ if $x = 1$, $y = 3$.

$2x + 3y = 2 \times 1 + 3 \times 3$

$= 2 + 9 = 11$ **Answer : 11**

Example 3 : If $a = 2$, $b = 3$, $c = 4$, find the value of $2a(b + c)$

$2a(b + c) = 2 \times 2 \times (3 + 4)$

$= 2 \times 2 \times 7 = 28$ **Answer : 28**



CD activity
20
Grandpa hunch

Example 4 : Find the value of $\frac{2a}{b}$ if $a = 8$, $b = 4$

$\frac{2a}{b} = \frac{2 \times 8}{4} = \frac{16}{4} = 4$ **Answer : 4**

Exercise 14.3

A. Write an algebraic expression for each of the following.

1. 2 subtracted from the sum of x and p
2. 3 times x added to 2 times y
3. a is added to the product of b and 3
4. x divided by the sum of 7 and y
5. 4 times b is subtracted from 5 times a
6. The products of a and b, b and c, c and d are added
7. c is subtracted from 4 times the product of a and b
8. 5 times the product of x and y, less 10
9. The product of m and 10, added to 10
10. 6 times the product of x, y and z, added to half of z.

B. Write the terms of the algebraic expressions.

1) $3x - 7$ 2) $4a - 5b$ 3) $6x + 3y + z$

4) $ax - by + 2$ 5) $mn + np + nq$

C. 1) If $a = 2$, $b = 3$, $c = 4$ find the values of the following.

a) $a + b + c$ b) $a + b - c$ c) $a + c - b$

d) $ab + bc$ e) $\frac{a \times b}{c}$

2) If $x = 1$, $y = 0$, $z = 2$ find the values of

a) $x + y + z$ b) $xy + yz$ c) $\frac{x - y}{z - x}$

d) $4y$ e) $\frac{1}{2}xz$

3) If $a = 2$, $b = \frac{1}{3}$, $c = \frac{1}{4}$ find the values of

a) $a + 3b$ b) $6a - c$ c) $4a + 2b - c$

d) $c(a + b)$ e) $\frac{3b + 4c}{a}$

• Like and unlike terms

Consider the terms $3a$, $5a$, $9a$, $5b$, $6b$, $2c$, $5c$

$3a$, $5a$ and $9a$ have the same variable a. Only the coefficients are different.

Such terms, which have the same variable are called **like terms.**

$5b$ and $6b$ are also like terms. So are $2c$ and $5c$.

$3a$ and $5b$ have different variables. They are called **unlike terms.**

$5b$ and $2c$ are unlike terms. So are $3a$ and $3c$.

Like terms can be added and subtracted together.

$3a + 9a = 12a$; $3c + 2c = 5c$

Similarly $7a - 2a = 5a$; $11a - 5a = 6a$

Notice that while adding or subtracting like terms, **only the coefficients are added or subtracted.**

In the case of unlike terms, addition and subtraction is written as

$3a + 5b,\ 8a - 3b$

Further simplification is not possible.

Exercise 14.4

A. Say whether like or unlike.

1) x, y 2) x, xy 3) $xy, 3xy$

4) xy, yx 5) abc, bac, cab 6) $2x, 3x$

7) $2ab, 3ba, 4ab$ 8) $8abc, 9bac, 10cab$ 9) $7, 5x, 3y$

B. Group the like terms. The first has been done for you.

1) $x, y, xy, 4x, 3y$ $(x, 4x)\ (y, 3y)$

2) $3a, 5x, 96b, 6a, 9x, 5a, 6b, 9b, 10y$

3) $4p, 5q, 2r, 3p, 10q, r, 3p, 4r, 10q$

4) $pq, 4pq, 3qp, pqr, 4pqr$

5) $xz, xy, yz, 2xy, 3xz, 5yz$

C. Write the sum.

1) x, y 2) $xy, 4xy$ 3) $3a, 4b$ 4) $3p, 4q$ 5) $ab, 4ab$

D. Write the difference.

1) x, y 2) $4xy, xy$ 3) $3a, 4b$ 4) $3p, 4q$ 5) $5ab, 2ab$

• Simplification

Example 1: Simplify: $3a + 5b + 6a + 2b$

To simplify, you have to group the like terms together and add their coefficients.

$$3a + 5b + 6a + 2b = (3a + 6a) + (5b + 2b)$$
$$= \mathbf{9a + 7b}$$

Example 2: Simplify: $5x + 3y - 3x + 8y$

$$5x + 3y - 3x + 8y = (5x - 3x) + (3y + 8y)$$
$$= \mathbf{2x + 11y}$$

Example 3: Simplify: $8a + 3b + c - 3a + 8b - 5a + 2b + 2c$

$8a + 3b + c - 3a + 8b - 5a + 2b + 2c = (8a - 3a - 5a) + (3b + 8b + 2b) + (c + 2c)$

$= \mathbf{13b + 3c}$

Exercise 14.5

Simplify

1) $3a + 2b + 4a + b$
2) $4a + 3b + 3a + 4b + 3a + 2b$
3) $8ab + 4cd + 3cd + 2ab$
4) $4x + 3y + z + 5x + 5y + 5z$
5) $x + y + xy + 2xy + 2y + 2x$
6) $10pq + 5q + 6q - 5pq$
8) $2a + 3b + 5a - 2b + 4a + 6b$
7) $3x + 3y + 3z + 6x + 6z + 6y$
9) $5p + 6q + 8p + 10q + 7p - 3q$
10) $3x + 4y + 5x + 6y + 7x + 9y$
11) $3x + 4y + 4y + 3z + 4x - 3z$
12) $2xy + 3yx + 4xz + 3xy + 2xz + yx + 10xz$

WORKSHEET
for formative assessment



MCQs

1. $b + b + b + b + b$ is written as:

   a) $5 + b$ b) $b\,5$ c) $5\,b$ d) $b + 5$

2. A number decreased by ninty–two can be written as:

   a) $92 - n$ b) $n - 92$ c) $n + 92$ d) $92 + n$

3. The value of $y + y - x$ where $x = 6$ and $y = 5$ is

   a) 6 b) 4 c) 3 d) 7

Hots question

Consider the following grid.

The number at the end of each row or column gives the total cost of the items in that row or column. Use the information to answer the questions.

a) What is the cost of 2 crayons?
b) What is the cost of 3 clocks?
c) What is the cost of 1 toy car?

				86
				77
				69
84	58	41	49	

Fun activity

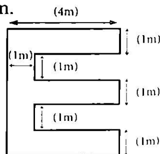
All 20 parking spaces in a parking lot are fulled. Some are occupied by motorcycles, and others by cars. There are 66 wheels in all. How many cars and how many motorcycles have been parked?

(*Hint* : Draw 20 boxes numbered 1 – 20 as shown to represent the parking lot. Draw 2 wheels in each box. How many wheels short? How many 2-wheelers have to be changed to 4-wheelers?)

1	2	3	4	5	6	7	8	9	10
○○	○○	○○	○○	○○	○○	○○	○○	○○	○○
11	12	13	14	15	16	17	18	19	20
○○	○○	○○	○○	○○	○○	○○	○○	○○	○○

Summative Assessment 2
(Chapters 8 – 14)

1. Fill in the blanks.
   i) Area of rectangle = __________ × __________.
   ii) Volume of cuboid = __________ × __________ × __________.
   iii) The interest you earn from money deposited in a bank depends on the __________, rate of __________ and the __________ of time which the money is deposited.
   iv) A century = __________years
   v) To convert a fraction into percentage we __________ by 100.
2. Choose the correct answer.
   a) How many minutes are there in a year?
      i) $365 \times 60 \times 60$ ii) $365 \times 24 \times 3600$ iii) $365 \times 24 \times 60$ iv) 365×3600
   b) The sum of the angles of a scalene triangle is
      i) Less than 180°   ii) More than 180°   iii) More than 90°   iv) Equal to 180°
   c) Profit means
      i) CP > SP   ii) CP = SP   iii) SP < CP   iv) SP > CP
   d) The perimeter of a square park is 84 m. Its area will be
      i) 336 sq. m   ii) 441 sq. m   iii) 168 sq. m   iv) 1764 sq. m
   e) The volume of the cube of side 6m is
      i) 3600 cu. m   ii) 216 cu. cm   iii) 216 cu. m   iv) 60 cu. m
3. Change
   i) $\frac{22}{25}$ into a percentage   ii) 0.91 into a percentage   iii) 23% into a decimal   iv) 1% into a fraction
4. i) Simplify $3a + 4b + 5a - b + 3b$ ii) Find the value of $3a(b + c)$ for $a = 2, b = 3, c = 4$
5. Make a bill for the following items: 6kg sugar at ₹ 16.50 per kg, 2kg salt at ₹ 6.25 per kg, 5kg rice at ₹ 25 per kg, $1\frac{1}{2}$ dozen bananas at ₹ 18 per dozen
6. i) Mrs Pandit bought a car for ₹ 120400. She sold it for a profit of 6%. Find the selling price of the car.
   ii) Mr Tikku borrowed ₹ 24000 from a bank for 3 years at 12% interest. Find the amount due from him after 3 years.
7. i) Two angles of a triangle are 50° and 70°. Find the third angle.
8. Find the area of a rectangle of length 2.5m and breadth 0.25 m.
9. i) A swimming pool is of length 25m, breadth 10 m, and the depth 2.5m. Find the amount of water the tank contains when completely full.
   ii) A metal block of dimensions 1.25m, 1.5m and 8m is melted and from it small cubes, each of volume 1 cu m are made. How many cubes can be made?
10. Find the area of the given figure.



Answers to Exercises

Chapter 1. Large Numbers

Recall Exercise: C. 1) ten thousand 2) one lakh 3) ten

Exercise 1.1: D. 1) 6723059, 6724060, 6725061, 2) 34251278, 34351278, 34451278, 3) 7021961, 7022061, 7022161 4) 69226021, 70226021, 71226021 5) 686236508, 786236509, 886236510

Exercise 1.2: A. 1) 3,00,000 + 80,000 + 5,000 + 600 + 90 + 6; 3,00,000 2) 40,00,000 + 8,00,000 + 90,000 + 6,000 + 500 + 90 + 3; 3 3) 80,00,00,000 + 9,00,00,000 + 60,00,000 + 7,00,000 + 50,000 + 3,000 + 200 + 10 + 4; 3000 4) 30,00,00,000 + 20,00,000 + 50,000 + 6,000 + 700 + 9; 30,00,00,000 5) 2,00,00,000 + 8,00,000 + 3,000 + 50; 3000 6) 6,00,00,000 + 40,00,000 + 3,00,000 + 60; 300000 7) 90,00,00,000 + 8,00,00,000 + 70,00,000 + 6,00,000 + 50,000 + 4,000 + 300 + 20 + 1; 300 8) 30,00,00,000 + 4,00,00,000 + 40,000 + 2,000 + 100 + 10 + 9; 30,00,00,000 B. 1) 65,43,211 2) 89,38,30,022 3) 50,50,50,505 4) 10,00,00,109 5) 6,00,54,78,091

Exercise 1.3: A. 1) < 2) > 3) < 4) < 5) > 6) >
B. 1) 3854798, 38547986, 385479850, 385479860
2) 18653496, 99999999, 338534896, 438534896
3) 634398, 6664398, 43986666, 66664398
4) 5896348, 5896349, 6896348, 6896349
5) 22226222, 22262222, 22622222, 2622222
C. 1) 3426799, 3415999, 3329567, 3025859
2) 345678912, 345678901, 234567891, 123456789
3) 578342100, 478342100, 57834210, 5783421
4) 78943025, 78940325, 78904325, 78094325
5) 921467352, 289453207, 86345943, 73546265
D. 1) 9999999 2) 99999999 3) 10000000
4) 100000000 E. 1) 304689 (smallest), 986430 (greatest) 2) 1045689 (smallest), 9865410 (greatest)
3) 10234679 (smallest), 97643210 (greatest)
4) 102346789 (smallest). 987643210 (greatest)
F. 1) 567345 (smallest), 39425060 (greatest)
2) 999999 (smallest), 10000000 (greatest)
3) 58400906 (smallest), 683495670 (greatest)
4) 123321123 (smallest), 321123321 (greatest)

Exercise 1.5: A. 1) 30 2) 190 3) 250 4) 100 5) 120 B. 1) 300 2) 5400 3) 4500 4) 900 5) 800 C. 1) 5000 2) 64,000 3) 1000 4) 2000 5) 1000 D. 1) 40000 2) 50000 3) 60000 4) 80000 5) 90000
E. 1) 200000 2) 200000 3) 400000 4) 600000 5) 900000 F. 1) 3000000 2) 5000000 3) 5000000 4) 9000000 5) 200000

Exercise 1.6: A. 1) XXXVI 2) XXXIX 3) DVI 4) DCCXCI 5) CCCXII 6) CMLXXIX 7) CMXCIX 8) DCCXXXI 9) MMDCCC 10) MCCCXLVII 11) MDXXVI 12) MMCCCL B. 1) 27 2) 39 3) 590 4) 59 5) 776 6) 969 7) 217 8) 404 9) 971 10) 1034 11) 1111 12) 1247

Chapter 2. Operations with numbers

Recall Exercise Add : 1) 68588 2) 85879
Subtract : 1) 122020 2) 528244 3) 63322
Multiply : 1) 14,000 2) 182259
Divide : 1) 120 2) 617 R 5 3) 1320 4) 193 R-1

Exercise 2.1: A. 1) 11173114 2) 6887756 3) 3363861 4) 1729432 5) 3006355 6) 2190286 7) 134406581 8) 816666665 B. 1) 2921324 2) 479990 3) 40155817 4) 88888888 5) 388918465 6) 708647103 7) 9067019 8) 909091
C. 1) 373164791 2) 504463344 3) 754305906 4) 120790819 5) 288917188 6) 1010101

Exercise 2.2: 1) ₹ 3604000, 1092000 2) 865444, 168672 3) ₹ 8673404 4) 30863568 5) 238581 6) 231885931 7) 29397477, 35894135 8) 100276504, candidate C. 9) Lost ₹ 89600 10) ₹ 364180

Exercise 2.3: 1) 127968 2) 42614 3) 90735 4) 433550 5) 2709908 6) 712047 7) 3384090 8) 5180172 9) 2359179 10) 1003378 11) 852018 12) 4190731 13) 10125600 14) 10497638 15) 15605316

Exercise 2.4: 1) ₹ 160740 2) 906400 3) 608025 4) 1259016 5) 77083146 6) ₹ 268542 7) 835425 8) 989901 9) 267860 10) 753600

Exercise 2.5: 1) 68564, R = 3 2) 240, R = 701 3) 346, R = 538 4) 66699, R = 87 5) 708, R = 901 6) 263, R = 648536

Exercise 2.6: 1) 155, R = 16 2) 163, R = 6 3) 34, R = 27 4) 133, R = 19 5) 120, R = 54 6) 96, R = 15 7) 89, R = 25 8) 102, R = 11

Exercise 2.7: 1) 1107, R = 40 2) 426, R = 7 3) 1971, R = 15 4) 1210, R = 71 5) 6266, R = 29 6) 5531, R = 37 7) 2203 R = 22 8) 9535, R = 52

9) 362, R = 56 10) 117, R = 14 11) 109, R = 155 12) 255, R = 50 13) 1406 R = 158 14) 1967, R = 172 15) 1747, R = 202

Exercise 2.8: 1) 28 2) 2008 3) 187 4) 65 5) 420 6) 1428 boxes, 267 oranges left over 7) 2822

Exercise 2.9: A. 1) 28 2) 24 3) 4 4) 5 5) $\frac{5}{12}$ 6) $\frac{5}{24}$ 7) 1 8) $\frac{2}{7}$ 9) $4\frac{1}{2}$ 10) $1\frac{2}{3}$ 11) $2\frac{11}{14}$

Exercise 2.10: A. 1) 17 2) 45 3) 22 4) 28 5) 17 6) 32 7) 11 8) 14 B. 1) 96 2) 7 3) 12 4) 18 5) 10 6) 6 7) 1 8) 6 C. 1) 17 2) ₹ 30 3) 35 hours 4) 275 5) ₹ 40 6) 320

Exercise 2.11: A. 1) $\frac{13}{18}$ 2) $\frac{5}{12}$ 3) $1\frac{2}{7}$ 4) $5\frac{1}{4}$ 5) $\frac{13}{60}$ 6) $5\frac{1}{3}$ 7) $\frac{7}{96}$ B. 1) $\frac{3}{8}$ 2) $\frac{6}{17}$ 3) $\frac{1}{4}$ 4) $2\frac{1}{6}$ 5) 94 6) 0

Exercise 2.12: 1) 42 2) 6.1 cm 3) Average weekly consumption: Family 1 = 15.5*l*; Family 2 = 16*l* 4) Average daily temperatures: Town A = 36°C, Town B = 40°C, Town A was cooler 5) Average = 149.17 cm (approx.); (a) 3, Arun, Ajit, Mohan; (b) 3, Ram, Shekhar, Sriram 6) 85 7) 5.5 8) 7 9) ₹ 1400 10) 44

Exercise 2.13: 1) ₹ 108 2) 1300 3) ₹ 320 4) 2500 kg 5) ₹ 1870 6) ₹ 35 7) ₹ 12000 8) ₹ 14 9) 11 hours 10) 34 m 11) ₹ 2640 12) (i) 270 (ii) 540 13) 18 14) 16 days

Chapter 3. Factors and Multiples

Recall Exercise: 1. i) Yes ii) Yes iii) No iv) Yes v) No 2. i) 1, 2, 4, 8, 16, 32 ii) 1, 2, 3, 6, 9, 18 iii) 1, 67 iv) 1, 5, 7, 35 v) 1, 7, 49

Exercise 3.2: A. 1) $2 \times 2 \times 3 \times 3$ 2) $2 \times 2 \times 2 \times 2 \times 2 \times 2$ 3) $3 \times 5 \times 5$ 4) 7×13 5) $2 \times 2 \times 2 \times 2 \times 7$ 6) $2 \times 2 \times 2 \times 3 \times 5$

Exercise 3.3: A. 1) 45 2) 10 3) 18 4) 7 5) 12 6) 32 B. 1) 171 2) 67 3) 64 4) 23 5) 47 6) 29 7) 19 8) 47 9) 81 10) 23 11) 51 12) 99

Exercise 3.4: A. 1) 432 2) 360 3) 195 4) 294 5) 210 6) 255 7) 228 8) 1008 9) 256 10) 2250 11) 3720 12) 450 13) 1680 14) 2990 15) 780 16) 15300

Exercise 3.5: B. 1) 96 2) 10 3) 64 4) 231

Exercise 3.6: 1) 70 2) 75 3) 360 4) 785 5) 299 6) 1250 7) 12 noon 8) 1 hr 10 min 9) 3 m 60 cm 10) 60

Exercise 3.7: B. 1) No 2) Yes 3) Yes 4) No 5) No D. 1) F 2) T 3) T 4) T 5) T

Chapter 4. Fractions

Recall Exercise: 1) $\frac{9}{2}, \frac{10}{3}, \frac{9}{4}, \frac{47}{8}$ 2) $9\frac{1}{2}, 2, 2\frac{1}{6}, 2\frac{3}{4}$ 3) $\frac{1}{8}, \frac{2}{3}, \frac{3}{5}, \frac{1}{2}$

Exercise 4.1: A. 1) $\frac{5}{7}$ 2) $\frac{3}{5}$ 3) $\frac{10}{11}$ 4) $\frac{28}{37}$ 5) $\frac{3}{7}$ 6) $\frac{4}{11}$ 7) $\frac{10}{101}$ 8) $\frac{3}{13}$ B. 1) $1\frac{13}{20}$ 2) $1\frac{7}{8}$ 3) $\frac{47}{60}$ 4) $\frac{15}{16}$ 5) 8 6) $4\frac{1}{24}$ 7) $4\frac{1}{9}$ 8) $7\frac{11}{36}$ 9) $13\frac{23}{48}$ 10) $4\frac{23}{48}$ 11) $6\frac{1}{2}$ C. 1) $\frac{8}{21}$ 2) $\frac{11}{24}$ 3) $\frac{5}{56}$ 4) $\frac{3}{20}$ 5) $1\frac{4}{5}$ 6) $\frac{4}{7}$ 7) $4\frac{4}{9}$ 8) $2\frac{2}{3}$ 9) $\frac{1}{4}$ 10) $1\frac{1}{4}$ 11) $3\frac{7}{8}$ 12) $1\frac{11}{12}$ D. 1) $\frac{1}{4}$ 2) $\frac{5}{12}$ 3) $1\frac{1}{12}$ 4) $1\frac{1}{8}$ 5) $1\frac{1}{4}$ 6) $1\frac{3}{8}$

Exercise 4.2: 1) $\frac{24}{7}$ 2) $\frac{18}{7}$ 3) $\frac{70}{9}$ 4) $\frac{45}{11}$ 5) $\frac{20}{5}$ or 4 6) $\frac{15}{7}$ 7) $\frac{24}{7}$ 8) $\frac{9}{7}$ 9) $\frac{42}{91}$ or $\frac{6}{13}$ 10) $\frac{35}{9}$ 11) $\frac{16}{11}$ 12) $\frac{21}{14}$ or $\frac{3}{2}$ 13) $\frac{45}{16}$ 14) $\frac{17}{10}$ 15) 0 16) $\frac{6}{11}$ 17) $\frac{12}{24}$ or $\frac{1}{2}$ 18) 0 19) $\frac{7}{10}$ 20) $\frac{24}{4}$ or 6

Exercise 4.3: 1) $\frac{1}{20}$ 2) $\frac{3}{28}$ 3) $\frac{2}{5}$ 4) $\frac{3}{22}$ 5) $\frac{3}{20}$ 6) $\frac{3}{4}$ 7) $\frac{1}{27}$ 8) $\frac{1}{6}$ 9) $\frac{1}{3}$ 10) $\frac{8}{13}$ 11) $\frac{4}{9}$ 12) $\frac{2}{21}$

Exercise 4.4: A. 1) 6 2) 2 3) 12 4) 6 5) 6 6) 8 7) 12 8) 9 B. 1) 10 2) 52 3) 44 4) $6\frac{2}{3}$ 5) 34 6) 18 7) 16 8) 22

Exercise 4.5: A. 1) $\frac{2}{3}$ 2) $1\frac{3}{5}$ 3) $1\frac{4}{5}$ 4) $\frac{9}{10}$ 5) $3\frac{3}{5}$ 6) $1\frac{5}{7}$ 7) $1\frac{3}{5}$ 8) $1\frac{1}{5}$ B. 1) 24 2) 10 3) $8\frac{4}{5}$ 4) $4\frac{41}{75}$

Exercise 4.6: 1) $\frac{2}{7}$ 2) $\frac{1}{3}$ 3) $\frac{1}{2}$ 4) $\frac{4}{3}$ 5) 0 6) $\frac{1}{2}$

Exercise 4.7: 1) $\frac{8}{105}$ 2) $1\frac{4}{5}$ 3) $\frac{3}{4}$ 4) $\frac{3}{10}$ 5) $\frac{1}{28}$ 6) $\frac{1}{20}$ 7) $297\frac{1}{2}$ 8) $21\frac{3}{5}$ 9) $1\frac{1}{3}$ 10) $7\frac{1}{7}$ 11) 9 12) 6

Exercise 4.8: 1) (a) $\frac{3}{12}$ m (b) 80 m (c) $\frac{5}{16}$ km or $312\frac{1}{2}$ m (d) $\frac{5}{24}$ (e) 3 min 2) ₹ 21 3) ₹ $24\frac{3}{4}$ 4) $5\frac{5}{8}$ km 5) ₹ $112\frac{1}{2}$ 6) 96 m 7) 1400 km

Exercise 4.9: 1) $\frac{7}{3}$ or $2\frac{1}{3}$ 2) $\frac{9}{7}$ or $1\frac{2}{7}$ 3) $\frac{1}{8}$ 4) 9 5) 1 6) $\frac{5}{12}$ 7) $\frac{3}{10}$ 8) $\frac{9}{43}$ 9) $\frac{4}{13}$ 10) $\frac{2}{5}$

Exercise 4.10: 1) $\frac{1}{7}$ 2) $\frac{4}{45}$ 3) $\frac{1}{12}$ 4) $\frac{2}{35}$ 5) $\frac{1}{8}$ 6) $\frac{2}{9}$ 7) $\frac{1}{18}$ 8) $\frac{6}{35}$ 9) $\frac{5}{24}$ 10) $\frac{1}{15}$ 11) $\frac{2}{35}$ 12) $\frac{5}{36}$

Exercise 4.11: 1) $8\frac{2}{5}$ 2) 42 3) 30 4) 30 5) 6 6) 40 7) $13\frac{1}{2}$ 8) $10\frac{2}{3}$ 9) 14 10) 40 11) 68 12) 15

Exercise 4.12: 1) $\frac{1}{2}$ 2) $1\frac{1}{4}$ 3) $1\frac{3}{4}$ 4) 10 5) 2 6) 4 7) 18 8) 16 9) $1\frac{2}{3}$ 10) 34 11) 6 12) 0

Exercise 4.13: 1) 1 2) 1 3) $\frac{4}{5}$ 4) $\frac{6}{7}$ 5) 0 6) 0 7) $2\frac{1}{2}$ 8) $\frac{4}{5}$

Exercise 4.14: 1) ₹ $5\frac{1}{2}$ 2) $3\frac{3}{4}$ km 3) $5\frac{1}{3}$ / 4) $\frac{3}{4}$ 5) $\frac{1}{3}$ kg 6) 32 km 7) 16 8) 10 9) $2 \div 2\frac{1}{2} = \frac{4}{5}$; $2 \div \frac{4}{5} = 2\frac{1}{2}$ 10) $\frac{1}{2}$

Chapter 5. Decimals

Exercise 5.1: B. 2) $3\frac{3}{10}$ 3) $15\frac{9}{10}$ 4) $\frac{15}{100}$ 5) $\frac{8}{1000}$ 6) $4\frac{9}{100}$ 7) $\frac{885}{1000}$ 8) $15\frac{36}{100}$ C. 2) 1.3 3) 7.4 4) 10.1 5) 5.45 6) 5.889 7) 1.009 8) 5.042

Exercise 5.2: B. 1) 4.6 2) 7.56 3) 16.205 4) 7.103 5) 25.036 6) 5.35 7) 16.12 8) 99.999 9) 80.506 10) 0.503

Exercise 5.3: 1) $3\frac{1}{5}$ 2) $1\frac{9}{10}$ 3) $2\frac{1}{25}$ 4) $6\frac{1}{4}$ 5) $\frac{23}{100}$ 6) $\frac{7}{20}$ 7) $9\frac{1}{200}$ 8) $\frac{1}{8}$ 9) $84\frac{23}{25}$ 10) $11\frac{111}{1000}$

Exercise 5.4: A. 1) Like 2) Like 3) Unlike 4) Unlike 5) Unlike B. 1) Like 2) Unlike 3) Unlike 4) Like 5) Unlike C. 1) 56.80, 7.11 2) 0.802, 54.320 3) 4.780, 9.193, 10.300 4) 36.190, 361.900, 3.619 5) 3.800, 18.920, 43.324 6) 49.620, 2.800, 1.493

Exercise 5.5: A. 1) < 2) > 3) > 4) > 5) < 6) < 7) > 8) < 9) > 10) = 11) < 12) < B. 1) 0.504, 0.68, 0.72, 1.02 2) 0.092, 1.09, 3.039, 3.32, 3.478 3) 0.979, 1.32, 7.99, 9.79, 10.00 4) 0.342, 0.839, 0.932, 2.93, 9.38 5) 5.439, 7.234, 7.32, 7.326 6) 0.002, 0.02, 0.2, 2.0 C. 1) 12.01, 11.201, 2.11, 1.201 2) 84.43, 48.34, 8.34, 0.844 3) 300.8, 30.08, 8.03, 8.003 4) 58.7, 50.78, 8.75, 7.85 5) 3.3, 3.03, 3.003, 0.03 6) 22.111, 21.212, 21.121, 21.111

Exercise 5.6: A. 1) 9.1 2) 12.0 3) 37.05 4) 1.139 5) 46.845 6) 11.11 7) 19.515 8) 36.431 9) 20.614 B. 1) 606.662 2) 602.23 3) 948.2 4) 477.145 5) 668.706 6) 597.718 7) 969.738 8) 131.561 9) 193.102 10) 64.648

Exercise 5.7: A. 1) 6.9 2) 3.9 3) 0.9 4) 1.5 5) 1.91 6) 4.4 7) 54.81 8) 3.18 9) 1.037 10) 11.145 11) 141.844 12) 29.879 B. 1) 41.046 2) 38.445 3) 0.018 4) 1.991 5) 0.902 6) 0.063 7) 5.428 8) 0.185 9) 0.028 10) 3.672 11) 0.009 12) 2.91

Exercise 5.8: A. 1) ₹ 80.07 2) ₹ 6.40 3) ₹ 10.10 4) 78.48 m 5) 1.01 m 6) 0.15 m 7) 1.01 kg 8) 0.2 kg 9) 11.965 kg 10) 100.001 kg 11) 50.5 / 12) 0.25 / B. 1) F 2) F 3) T 4) F 5) F 6) T C. 1) ₹ 154.31 2) 144.47 m 3) 31.979 km 4) 121.35 kg 5) 96.79 / D. 1) ₹ 32.02 2) 0.55 m 3) 10.09 km 4) 0.088 kg 5) 0.999 / E. 1) ₹ 144.45 2) 10.3 km 3) 30.9 / 4) ₹ 150.12 5) 14.57 6) 3.671 7) 22 kg 8) ₹ 8.92 9) 6.5 / 10) (i) A to P, 20.48 km (ii) B to P, 16.6 km (iii) B to Q 14.1 km (iv) B to Q, 11.8 km (v) A to R, 2.3 km.

Exercise 5.9: 1) 1.24 2) 0.56 3) 0.85 4) 0.48 5) 0.21 6) 1.17 7) 1.92 8) 0.56 9) 1.86 10) 2.24 11) 1.6 12) 0.72 13) 27.3 14) 78.2 15) 174.8 16) 264.6 17) 265.72 18) 208.32 19) 483.21 20) 53.04 21) 1266.66 22) 921.27 23) 1144.72 24) 629.37

Exercise 5.10: A. 1) 10.2 2) 132 3) 480.3 4) 1283 5) 1480.5 6) 1480.23 7) 4920 8) 313.7 9) 320 10) 3005 11) 3110 12) 32200.5 13) 48220 14) 34909 15) 3020 16) 6032 17) 9001 18) 78632 19) 128300 20) 492050 / B. 1) 22.82 2) 227.723 3) 118.293 4) 118.23 5) 247.5 6) 123.52 7) 115.472 8) 223.4628 9) 1581.956 10) 87.2146 11) 216.8736 12) 1362.4792 / C. 1) (a) 1144.26 (b) 0.114426 (c) 114.426 2) (a) 100 (b) 10 (c) 0.325 (d) 0.3 / D. 1) 23.25 km 2) ₹ 39.15 3) 154 km 4) 19.6 kg 5) 86.25 metres 6) 29.7 ℓ

Exercise 5.11: A. 1) 0.8 2) 3 3) 0.4 4) 13.202 5) 0 6) 0 7) 19.634 8) 0.001 9) 0 10) 9.89 11) 1.2 12) 3.8

Exercise 5.12: 1) 0.3 2) 0.2 3) 0.05 4) 0.06 5) 0.08 6) 0.07 7) 0.09 8) 0.05 9) 0.12 10) 0.04 11) 0.11 12) 0.07

Exercise 5.13: 1) 8.1 2) 4.1 3) 4.1 4) 6.1 5) 2.1 6) 10.2 7) 3.1 8) 6.3 9) 4.1 10) 3.1 11) 4.1 12) 10.3 13) 5.1 14) 16.2 15) 5.2 16) 9.3 17) 8.1 18) 5.1 19) 6.1 20) 2.1

Exercise 5.14: A. 1) 0.45 2) 0.34 3) 0.28 4) 0.77 5) 0.041 6) 0.056 7) 1.28 8) 1.54 9) 16.93 10) 7.47 11) 15.24 12) 16.97 B. 1) 0.345 2) 2.46 3) 2.22 4) 9.24 5) 0.214 6) 24.35 7) 12.65 8) 12.525 9) 8.475 10) 10.425 11) 13.475 12) 12.578

Exercise 5.15: A. 1) (a) 56.34 (b) 5.634 (c) 0.5634 (d) 0.5634 (e) 0.05634 (f) 0.005634 2) 5.4 3) 0.38 4) 0.0796 5) 0.4854 6) 0.036329 7) 0.3489 8) 0.039 9) 0.489 10) 0.01656 11) 0.189 12) 0.0089
B. 1) 10.212 2) 0.1212 3) 13.604 4) 2.4158 5) 0.1734 6) 0.1631 7) 0.421 8) 7.33 9) 0.0824 10) 0.437 11) 0.08485 12) 8.5607

Exercise 5.16: A. 1) 0.48 2) 0.72 3) 0.77 4) 0.041 5) 0.056 6) 0.064 7) 1.54 8) 3.07 9) 12.78 10) 16.93 11) 1.138 12) 12.45 13) 15.24 14) 32 15) 1120 16) 64200 17) 120 18) 600 19) 320 20) 68.57
B. 1) 40.34 kmph 2) ₹ 949.93 3) 50.76 kg 4) ₹ 31.20 5) 40 6) 140 7) 80

Exercise 5.17: 1) 0.1 2) 0.25 3) 0.5 4) 0.2 5) 0.125 6) 0.05 7) 0.025 8) 0.02 9) 0.0625 10) 0.04 11) 0.4 12) 0.625 13) 0.5625 14) 0.4 15) 0.75 16) 1.75 17) 5.625 18) 30.16 19) 6.6 20) 2.375

Exercise 5.18: A. 1) 5 2) 4 3) 1 4) 6 5) 11 6) 12
B. 1) 14.6 2) 26.3 3) 15.9 4) 6.1 5) 7.1 6) 5.7
C. 1) 6.39 2) 4.04 3) 5.35 4) 1.33 5) 0.56 6) 3.01 7) 23.46 8) 6.00 D. 1) 0.38 2) 0.06 3) 0.43 4) 0.53 5) 0.88 6) 0.23

Chapter 6. Metric Measures and Temperature

Recall Exercise: 1) 1000 2) 1000 3) 3 g 800 mg 4) 3 km 848 m 5) 212 kg 895 g 6) 7984 km 858 m

Exercise 6.1: A. 1) 51.8 cm 2) 6.7 cm 3) 85.6 cm 4) 0.1 cm 5) 7.9 cm 6) 34.1 cm 7) 1.8 cm 8) 10.2 cm 9) 0.8 cm 10) 40.3 cm B. 1) 0.518g 2) 0.074 g 3) 0.005 g 4) 0.78 g 5) 3.42 g 6) 17.03 g 7) 0.543 g 8) 6.325 g 9) 0.076 g 10) 31.8 g C. 1) 0.0483 daℓ 2) 0.46 daℓ 3) 553.2 daℓ 4) 2.193 daℓ 5) 0.024 daℓ 6) 0.005 daℓ 7) 7.48 daℓ 8) 0.7342 daℓ 9) 0.0340 daℓ 10) 0.0003 daℓ D. 1) 0.23004 km 2) 3.465 km 3) 0.00070486 km 4) 35.34 km 5) 48.3 km 6) 0.048 km 7) 0.432 km 8) 0.000345 km 9) 0.00032 km 10) 0.00006 km

Exercise 6.2: A. 1) 790.797 kg 2) 1129.436 ℓ 3) 190.19 kg 4) 135.424 m 5) 1546.351 km 6) 112.7 m 7) 117.7 cm 8) 149.13g B. 1) 21.927 Kℓ 2) 17.05 m 3) 21.911 Kg 4) 9.669 kg 5) 4.353 m 6) 1391.952 km 7) 1.4 cm 8) 0.039 m

Exercise 6.3: A. 1) 112.216 m 2) 54.48 km 3) 7.8048 hm 4) 85.305 g 5) 1140.0285 hg 6) 0.9224 daℓ 7) 6197.95 daℓ 8) 763.8 ℓ 9) 16.8825 daℓ 10) 0.2166 ki B. 1) 68.26 m 2) 96.187 km 3) 3.521 hm 4) 6.597 ℓ 5) 3.217 kℓ 6) 0.37 h / 7) 0.935 g 8) 0.0201 hg 9) 0.532 g 10) 0.119 kg

Exercise 6.4: A. 1) 32°F 2) 77°F 3) 86°F 4) 104°F 5) 212°F B. 1) 50°C 2) 55°C 3) 60°C 4) 70°C 5) 90°C

Chapter 7. Geometry

Exercise 7.3: 1) 45° 2) 60° 3) 90° 4) 120° 5) 150° 6) 180° 7) 75° 8) 110° 9) 50°

Exercise 7.4: 1) 145°, Obtuse 2) 90°, Right 3) 90°, Right 4) 180° straight 5) 150°, Obtuse 6) 30°,Acute

Exercise 7.8: A. 2) Parallel 3) Parallel 4) Intersecting 5) Intersecting perpendicular 6) Intersecting **B.** 1) 2) 3) Parallel as will as Intersecting perpendicular 4) Intersecting

Exercise 7.9: A. 1) 50° 2) 45° 3) 60° 4) 65° 5) 30° 6) 40° B. 1) No 2) No 3) Yes 4) No 5) yes
C. 1) Possible 2) Not possible 3) Possible 4) Possible 5) Not possible 6) Possible

Exercise 7.10: A. 1) Equilateral 2) Isosceles 3) Equilateral 4), 5) and 6) Scalene **B.** 1) Right-angled 2) Obtuse-angled 3) Acute-angled 4) Obtuse-angled 5) Right-angled 6) Acute-angled.

Exercise 7.11: D. (i) 10.8 cm (ii) 7.2 cm (iii) 9.6 cm (iv) 10 m (v) 12.6 cm E. (i) 3.2 cm (ii) 4 cm (iii) 2.3 cm (iv) 2.5 m (v) 5 km

Exercise 7.12: A. (i) 31.4 cm (ii) 17.27 cm (iii)1 cm (iv) 11 m (v) 10.048 cm B. (i) 13.2 cm (ii) 125.6 cm (iii) 31.4 m (iv) 48.4 cm (v) 2 cm C. (i) 2.45 cm (ii) 0.5 cm (iii) 0.7 cm (iv) 3.5 m (v) 5 cm D. (i) 1.4 m (ii) 2.1 cm (iii) 3.5 cm (iv) 10 cm (v) 5 cm

Summative Assessment 1 (Chapters 1–7)

1. a) V , X, C b) One c) 2 d) Product e) 10 , 100, 1000 2. a) ii b) iii c) ii d) iii e) iii 3. i) 30 + 20 $\frac{6}{10}+\frac{8}{100}$ ii) $\frac{17}{8}$ iii) $10\frac{7}{24}$ iv) $2\frac{3}{16}$ v) $7\frac{1}{2}$ 4. i) 24 ii) 15 5. i) 1 ii) ₹ 2151750 6. 20 7. a) i) 56540 ii) 57000 iii) 60,000 iv) 100000 b) 358 8. i) ₹36.25 ii) ₹ 5.55 10. 22

Chapter 8. Area and Volume

Recall Exercise 1) 6 sq. cm 2) 5 sq. cm. 3) 9 sq cm 4) 9 sq cm 5) 11 sq cm 6) 9 sq cm 7) 9 sq cm 8) 5 sq cm

Math lab activity 1) 5 sq cm 2) 9 sq cm 3) 4 sq cm 4) 10 sq cm 5) 6 sq cm 6) 6 sq cm 7) 4 sq cm 8) 8 sq cm 9) 10 sq cm 10) 14 sq cm 11) 24 sq cm

Exercise 8.1: 1) 14 sq cm 2) 13 sq cm 3) 12 sq cm

Exercise 8.3: A. 1) 8 sq cm 2) 18 sq cm 3) 9 sq cm 4) 4 sq cm 5) 8 sq cm 6) 4 sq cm B. 1) 12 sq cm 2) 17 sq cm 3) 6 sq cm

Exercise 8.4 : 1) 14 sq cm 2) 6.25 sq cm 3) 19.25 sq cm 4) Perimeter = 400 m, Area = 10 000 sq m 5) 42 cm 108 sq cm 6) 22 500 sq m ₹ 225000 7) 1525 sq m ₹ 9912.5 8) 150 ₹ 2325 9) ₹ 537.50 10) 12

Exercise 8.5: 1) 12 cu units 2) 6 cu units 3) 7 cu units 4) 14 cu units 5) 9 cu units

Exercise 8.7: 1) (a) 8 cubic cm (b) 20 cubic cm (c) 64 cubic cm (d) 8 cubic cm (e) 3 cubic cm (f) 12 cubic cm 2) (a) 3375 cubic cm (b) 274.625 cubic m (c) 8000 cubic cm (d) 1953.125 cubic m (e) 3442.951 cubic cm (f) 19.683 cubic cm (g) 27000 cubic cm (h) 32.768 cubic cm 3) (a) 2880 cubic cm (b) 17.28 cubic cm (c) 7.5 cubic cm (d) 9.52 cubic cm 4) 600 cubic m 5) 280 cubic m 6) 382.2 cubic cm 7) 3150 cubic cm 8) 60 9) 13.824 cu m 10) 80 kg

Chapter 9. Percentages

Exercise 9.1: 1) 33% 2) 25% 3) 1% 4) 9% 5) 45% 6) 11% 7) 19% 8) 89% 9) 98% 10) 99% 11) 40% 12) 15% 13) 72% 14) 25% 15) 10% 16) 16% 17) 60% 18) 75%

Exercise 9.2: 1) 10% 2) 60% 3) 5% 4) 80% 5) 35% 6) 55% 7) 14% 8) 12% 9) 80% 10) 84% 11) 38% 12) 56% 13) 60% 14) 130% 15) 540%

Exercise 9.3: 1) $\frac{1}{4}$ 2) $\frac{1}{20}$ 3) $\frac{7}{10}$ 4) $\frac{11}{20}$ 5) $\frac{16}{25}$ 6) $\frac{79}{100}$ 7) $\frac{11}{100}$ 8) $\frac{1}{50}$ 9) $\frac{33}{100}$ 10) $\frac{37}{100}$

Exercise 9.4: 1) 0.06 2) 0.32 3) 0.9 4) 0.01 5) 0.03 6) 0.65 7) 0.99 8) 0.7 9) 0.24 10) 1.0

Exercise 9.5: 1) 48% 2) 80% 3) 3% 4) 35% 5) 52% 6) 91% 7) 1% 8) 11% 9) 19% 10) 10%

Exercise 9.6: A. 1) 40% 2) 19% 3) 8% 4) 23% 5) 62% B. 1) 100% 2) 90% 3) 80% 4) 10% 5) 1% C. 1) 9% 2) 90% 3) 0.9% 4) 0.2% 5) 100%

Exercise 9.7: A. 1) 1 2) 8 3) 5.12 4) 9 5) 125 6) 120 7) 144 8) 32 9) 3840 10) 150 B. 20% 2) 25% 3) 33.33% 4) 25% 5) 25% 6) 25% C. 1) ₹ 350 2) 64% 3) 90% 4) girls: 15, boys: 35 5) 300 6) hockey: 20%, football: 30% hockey/football: 50%, do not play : 50% 7) wife: ₹ 45000, son: ₹ 9000 8) bus: 900 km, train: 600 km 9) 17, 18 10) Maths: 72%, English: 80%, Hindi: 90%

Life Skill Exercises

1) (a) 66.67%; (b) 100 kg 2) a) $\frac{3}{4}$; (b) 25% 3) $96\frac{1}{2}$% 4) (a) 5.4/; (b) 2.7/ 5) (a) 45/ (b) 545/ 6) $\frac{4}{5}$ 7) 75%

Chapter 10. Money

Exercise 10.1: A. 1) ₹300.80 2) ₹ 911.53 3) ₹ 1040.61 B. 1) ₹ 820.83 2) ₹ 200.66 3) ₹ 142.33 4) ₹ 44.05 C. 1) ₹ 650.09 2) ₹ 831.36 3) ₹ 3201.12 4) ₹ 10095.50 5) ₹ 18202.58 6) ₹ 30527.10 D. 1) ₹87.70 2) ₹ 67.51 3) ₹ 9.89 4) ₹ 61.21 5) ₹ 35.72 6) ₹ 27.09 E. 1) ₹ 6402.00 2) ₹ 2499.75 3) ₹ 1134.28 4) ₹ 52.30 5) 2 km 6) ₹ 2762.50 7) ₹ 2.5 8) ₹ 294.00 9) ₹ 102.75, ₹ 47.25 10) (i) ₹ 152.75 (ii) ₹ 1833.00

Exercise 10.2: A. 1) Profit = ₹ 24 2) Loss = ₹ 16 3) Loss = ₹ 19 4) Loss = ₹ 5 5) Loss = ₹ 31 B. 1) ₹ 160 2) ₹ 230 3) ₹ 335 4) ₹ 521 5) ₹ 588 C. 1) ₹ 117 2) ₹ 206 3) ₹ 190 4) ₹ 195 5) ₹ 336 D. 1) ₹ 653 2) ₹ 302 3) ₹ 5500 4) ₹ 492 5) ₹ 6100 6) ₹ 500 7) ₹ 550

Exercise 10.3: A. 1) gain = 20% 2) Loss = 20% 3) Loss = 25% 4) Loss = 2.5% B. 1) ₹ 28.80 2) ₹ 2000 3) ₹ 68 4) 332.50 C. 1) ₹ 100 2) ₹ 4000 3) ₹ 750 4) ₹ 2000 D. 1) 25% 2) 20% 3) 11.11% 4) 25% 5) 2.78% 6) 20% 7) loss = 4.375% 8) ₹ 59832 9) ₹ 67.50 10) ₹ 646 11) ₹ 12.60 12) ₹ 10000

Exercise 10.4: A. 1) Int = ₹ 1250, Amt = 3750 2) Int = ₹ 448, Amt = 1008 3) Int = ₹180, Amt = ₹1980 4) Int = ₹ 3300, Amt = ₹ 18300 5) Int = 2340, Amit = ₹ 8840 B. 1) ₹ 15 2) ₹ 50 3) ₹ 64 4) ₹ 8 5) ₹ 120 C. 1) ₹ 80 2) ₹ 50 3) ₹ 15 4) ₹ 252 5) ₹ 80 D. 1) ₹ 1452 2) ₹ 6390 3) ₹ 636 4) ₹ 12300 5) 60%

Exercise 10.5: B. 1) Total = ₹ 245, Change = ₹ 255, 2) Total = ₹ 217, Change = ₹ 283 3) Total = ₹ 180, Change = ₹ 320 4) Total = ₹ 144, Change = ₹ 356 C. Totals 1) ₹ 476 2) ₹ 1065 3) ₹ 125 4) ₹ 64 5) ₹ 76 6) ₹ 456 7) ₹ 83 8) ₹ 1406 9) ₹ 429 10) ₹ 546

Chapter 11. Time

Recall Exercise: 1. 3:45, 6:20, 3. a) 2:45pm b) 2:20 am c) 6:30pm d) 9:25am e) 4:25am f) 10:25 am 4. a) 4:35am b) 11:50am c) 12 noon d) 2:00am

Exercise 11.1: A. 1) 300 minutes 2) 600 minutes 3) 1440 minutes 4) 90 minutes 5) 610 minutes 6) 525 minutes B. 1) 1 hour 15 minutes 2) 3 hours 20 minutes 3) 10 hours 4) 9 hours 10 minutes 5) 110 hours 6) 6 hours 20 minutes C. 1) 300 seconds

2) 900 seconds 3) 3600 seconds 4) 190 seconds 5) 605 seconds 6) 775 seconds D. 1) 8 minutes 2) 10 minutes 3) 60 minutes 4) 8 minutes 20 seconds 5) 13 minutes 40 seconds 6) 25 minutes 50 seconds

Exercise 11.2: A. 1) 730 days 2) 1925 days 3) 300 days 4) 165 days 5) 49 days 6) 145 days B. 1) 7 weeks 2) 51 weeks 3 days 3) 6 weeks 3 days 4) 1 week 3 days C. 1) 4 months 2) 12 months 5 days 3) 1 month 15 days 4) 2 months D. 1) 60 months 2) 120 months 3) 53 months 4) 78 months E. 1) 6 years 2) 4 years 2 months 3) 9 years 4 months 4) 5 years.

Exercise 11.3: A. 1) 12 hours 5 minutes 2) 15 hours 3) 11 minutes 30 seconds 4) 45 minutes 55 seconds 5) 14 years 1 month 6) 15 years

Exercise 11.4: A. 1) 1 hour 30 minutes 2) 45 minutes 3) 9 minutes 30 seconds 4) 45 minutes 55 seconds 5) 14 years 1 month 6) 15 years

Exercise 11.5:

Train No.	Arrival at	Time	Departure from	Time
4678	Agra Cant, Khandwa	1342 0321	Gwalior Manmad	1548 0840
1037	Mathura Bhopal	1720 0715	Bhusaval Khandwa	0520 1628
1057	Manmad Hazarat Nizamudin	0343 0639	Bhusaval Khandwa	0720 0955

Exercise 11.6: 1) Chennai-Surat-Ahmedabad 2) 6 3) Distances in km from Chennai 4) 2 5) 2642 6) 2641 7) (a) 420 km; (b) 336 km; (c) 164 km; (d) 1899 km 8) (a) 2h 25 min (b) 11 h (c) 30 h 20 min (d) 34 h 40 min (e) 1 h 58 min (f) 20 h 52 min (g) 11 h 15 min (h) 34 h 25 min

Chapter 13 Number patterns

Exercise 13.1: 1) (a) 11,13 (b) 81,243 (c) 33,65 (d) 121,364 (e) 41,122 2) 1,9 4) (i) 1,7 (ii) 1,7,11

Chapter 14 Algebra (Optional chapter)

Exercise 14.1: 1) $x - 4$ 2) $3y + 5$ 3) $\frac{z}{2}$ 4) $p + q$ 5) $(7 + x) - 6$ 6) $\frac{7}{p-2}$ 7) $3y + 2x$ 8) $l \times b$

Exercise 14.2: 1) 8 2) 80 3) 4 4) a 5) 10 6) n 7) 4x 8) 44 9) 9q 10) q

Exercise 14.3: A. 1) $(x + p) - 2$ 2) $2y + 3x$ 3) $b \times 3 + a$ 4) $x \div (7 + y)$ 5) $5a - 4b$ 6) $ab + bc + cd$ 7 $4ab - c$ 8) $5xy - 10$ 9) $10 + 10m$ 10) $\frac{z}{2} + 6xyz$ B. 1) 3x, – 7 2) 4a, – 5b 3) 6x, 3y, z 4) ax, – by, 2 5) mn, np, pq C. 1) (a) 9 (b) 1 (c) 3 (d) 18 (e) $\frac{6}{4}$ 2) (a) 3 (b) 0 (c) 1 (d) 0 (e) 1 3) (a) 3 (b) $11\frac{3}{2}$ (c) $8\frac{5}{12}$ d) $\frac{7}{12}$ (e) 1

Exercise 14.4: B. 2) (3a, 6a, 5a) (6b, 9b, 96b) (5x, 9x) 3) (4p, 3p) (5q, 10q) 2r, r, 4r) 4) (pq, 4pq, 3pd) (pqr, 4pqr) 5) (xz, 3xz) (xy, 2xy) (yz, 5yz) C. 1) $x + y$ 2) $5xy$ 3) $3a + 4b$ 4) $3p + 4q$ 5) $5ab$ D. 1) $x - y$ 2) $3xy$ 3) $3a - 4b$ 4) $3p - 4q$ 5) $3ab$

Exercise 14.5: 1) $7a + 3b$ 2) $10a + 9b$ 3) $10ab + 7cd$ 4) $9x + 8y + 6z$ 5) $3x + 3y + 3xy$ 6) $5pq + 11q$ 7) $9x + 9y + 9z$ 8) $11a + 7b$ 9) $20p + 13q$ 10) $15x + 19y$ 11) $7x + 8y$ 12) $9xy + 16xz$

Summative Assessment 2 (Chapters 8–14)

1. i) length × breadth ii) length × breadth × height iii) principal, interest, period iv) 100 v) divide 2. a) iii b) iv c) iv d) ii e) iii 3. a) 88% b) 91% c) 0.23 d) $\frac{1}{100}$ 4. i) $8a + 6b$ ii) 42 6. i) ₹ 127624 ii) ₹ 32640 7. 60° 8. 0.625sq.m 9. i) 625 cm ii) 15 10. 14 sqm

Answers to worksheets

Chapter 1

1) b 2) c 3) b 4) c 5) b

A. a) 10000000 b) 100000000 c) 9999999 d) 99999999 B. 75,000000 C. 1000009999

Chapter 2

1) c 2) d 3) a 4) c 5) b

Hots questions 1) 654 2) 126 3) $5\frac{1}{6}$ 4) 24 hours 5) 18

Chapter 3

1) c 2) b 3) d 4) c 5) b

Hots questions 1) 18,36,54,72,90 2) 30030 3)36

Chapter 4

1) d 2) b, c 3) a 4) $\frac{6}{35}$ 5) 1

Hots questions 1) 66 pieces, 1 m 2) 2 3) $\frac{4km}{5}$

Fun activity red square $\frac{4}{16}$, blue square $\frac{1}{16}$, orange square $\frac{1}{8}$, green square $\frac{1}{8}$, black square $\frac{3}{16}$, yellow square $\frac{3}{16}$, no colour $\frac{2}{16}$

Chapter 5

1) a 2) b 3) c 4) c 5) c

Hots questions 1. 15 kg , 25.2 kg , 10.8kg

2. a) 112.1201 b) 1121.201 c) 112.1201 d) 11212.01

Chapter 6

1) b 2) b 3) c 4) b 5) d

Hots questions 1. a) Manali c) New Delhi d) Manali e) Shimla

Chapter 7

1) a 2) d 3) d 4) b 5) d

Hots questions 1) 3 sides 2) 785 feet

Chapter 8

1) b 2) b 3) c 4) a 5) c

Hots questions 1.1) 5 cm 2) 3 cm 3) 1.5 cm, 1.25 sq m 4) 7.5 cm 5) 2.5 cm 2.5 cm 2. 47 3. 28

Chapter 9

1) c 2) b 3) d 4) b

Hots questions 1) 157.5 2) 300% 3) 400 4) 160

Chapter 10

1) c 2) c 3) d 4) 5)

Hots questions 1) rate = $8\frac{1}{2}\%$, principal 290, Interest ₹ 20 2) ₹ 133.33 3) b 4) 50%

Chapter 11

1) c 2) d 3) b 4) c 5) c

Hots questions friday

Chapter 12

1) c 2) d 3) c 4) d

Chapter 13

1) a 2) c 3) b

Hots questions The house numbers are 7, 9, 11, 13, 15

Chapter 14

1) c 2) b 3) b

Hots questions Cost of one croyon is 28, one car = 11 and one clock = 19

a) 2 × 28 = 56 b) 3 × 19 = 57 c) 11

Fun activity 13 cars and 7 motor cycle